

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## New Form of Tubular Boiler.

The accompanying illustrations show a new form of tubular boiler, which has proved itself particularly successful. It is from designs by Mr. Charles Brown, managing director of the Swiss Locomotive Works, Winterthur. In a recent issue *Engineering* had a long and very interesting article in regard to this boiler, from which we take some of the following description. As will be seen from the engravings, the boiler is of the tubular pattern with a cylindrical shell, resembling in some respects the locomotive pattern. The fire-box is surrounded by water save at the front side, the water legs be-

are 83 tubes, 3 inches outside and about 2 3/4 inches inside diameter.

One of the most noticeable features of the construction is a small cylindrical barrel, having its center line slightly above the water line, and projecting some distance forward of the smoke-box tube plate and through the brickwork casing in which the boiler is inclosed. The outer end of this small barrel is provided with a manhole cover, while on the upper side of the projecting portion are mounted the safety valves, and to the lower side is connected the feed inlet pipe, as shown in Figs. 1 and 5. Inside the boiler at the smoke-box end are fixed partitions, forming a kind of saddle

way in which the application of the principle has been carried out, promises very well for its success, and it is said that the results attained by it have been of the most satisfactory character.

Another special feature in the boiler consists in the arrangement of fire grate. As we have already stated, there is no water space at the front of the fire-box, the front, in fact, being closed in by a casting which is fixed in the brick setting of the boiler, and which carries the fire-box, ash-pit, door, &c. The fire bars are set to a steep slope, as shown in Fig. 1, but instead of being made straight as usual, they are so shaped that their upper sides form a catenary curve.

It is shown in section in Fig. 1, and a front view is given in Fig. 4. It will be noticed that the grate bars do not extend to the tube plate, a space being left which is filled up with ashes before starting. When the boiler is at work these ashes are gradually cleared away, their place being filled up by the new clinkers and ashes formed. In the case of the boiler at the Swiss Locomotive Works, the fire is lit only once in four weeks, or when the boiler is washed out, and during the night the coals remaining in the grate are pushed back in a heap on the ash bank. On their being raked back on to the bars again in the morning the fire starts afresh. This arrangement of grate

rounded by a brick casing, the form of which will be readily understood from our engravings. It will be seen from these that the products of combustion, after leaving the tubes at the smoke-box end, are free to come into contact with the whole of the external surface of the boiler, both below and above the water line, eventually passing off to the chimney through the flue shown in Figs. 1 and 5. The boiler itself is fixed at the front end, while the smoke-box end is free to move, the barrel having fitted to it a cast-iron frame carrying wheels which run on rails, as shown in Figs. 1 and 4. This mode of carrying the boiler greatly facilitates its partial removal from its casing in

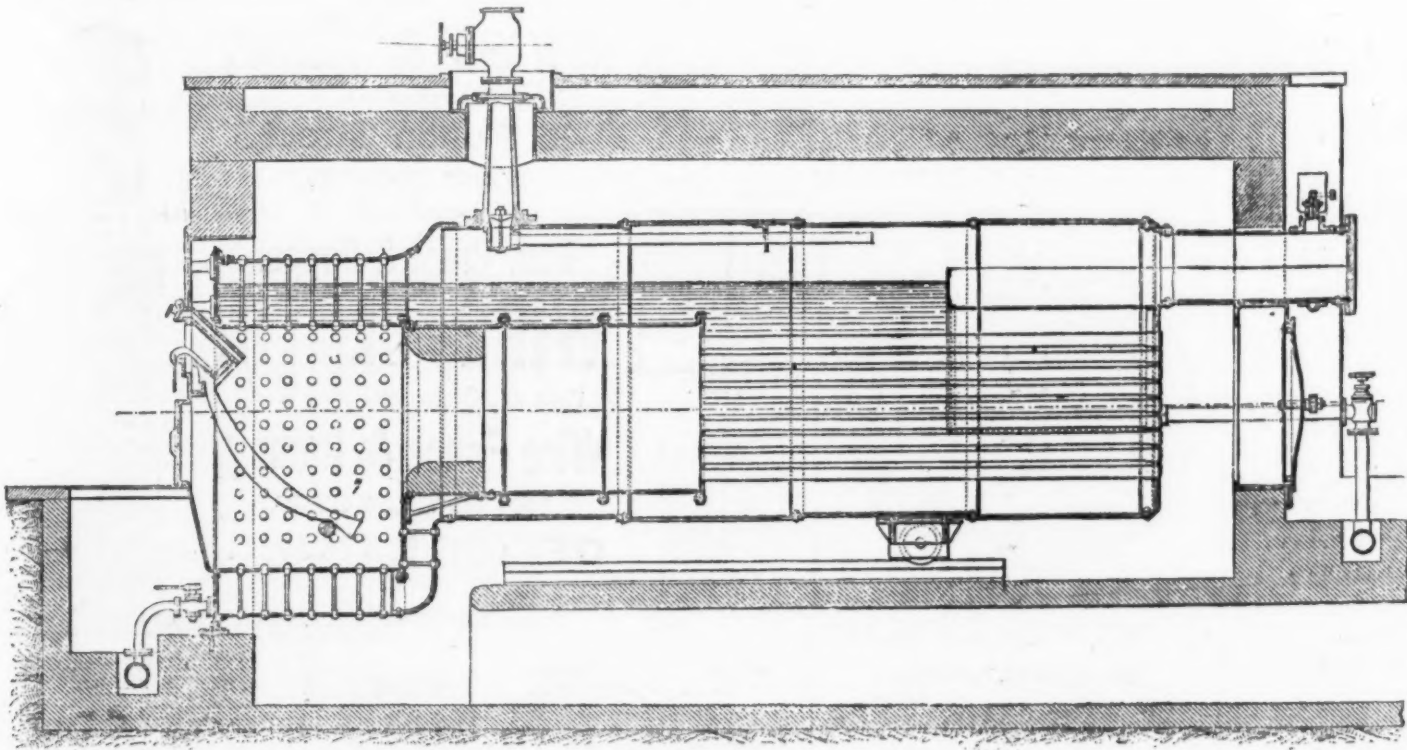


Fig. 1.—Longitudinal Section.

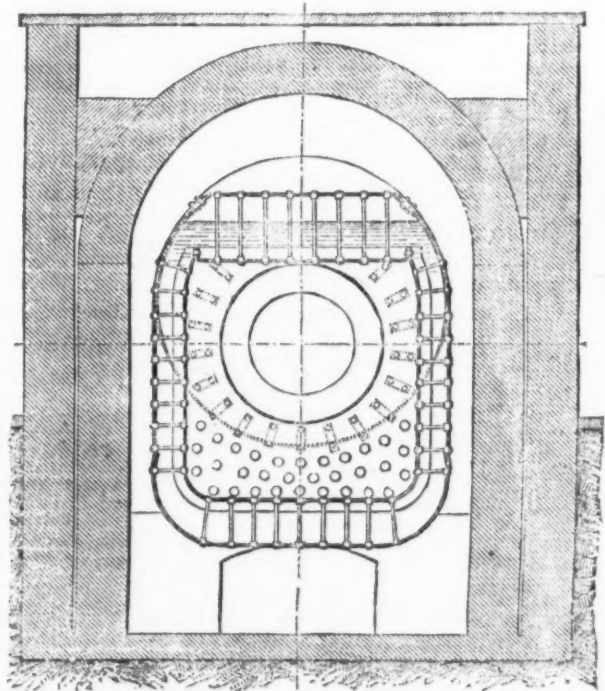


Fig. 2.—Cross Section through Fire-box.

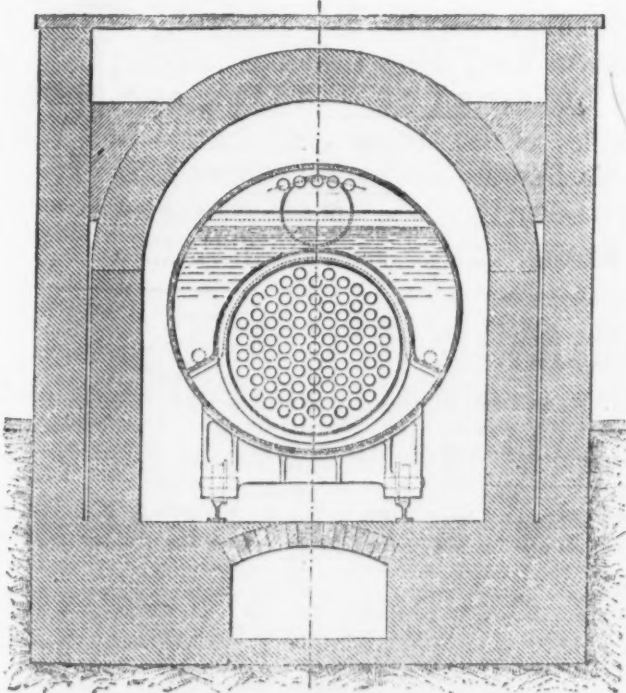


Fig. 3.—Cross Section through Tubes and Heater.

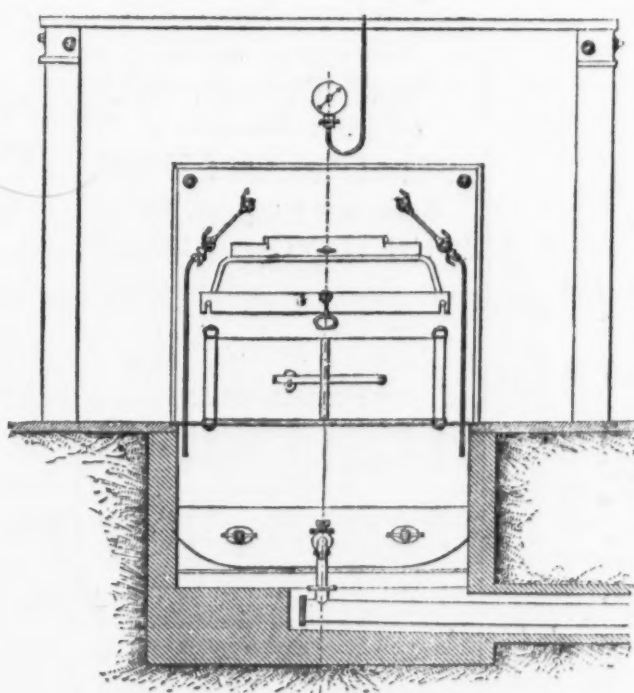


Fig. 4.—Front View.

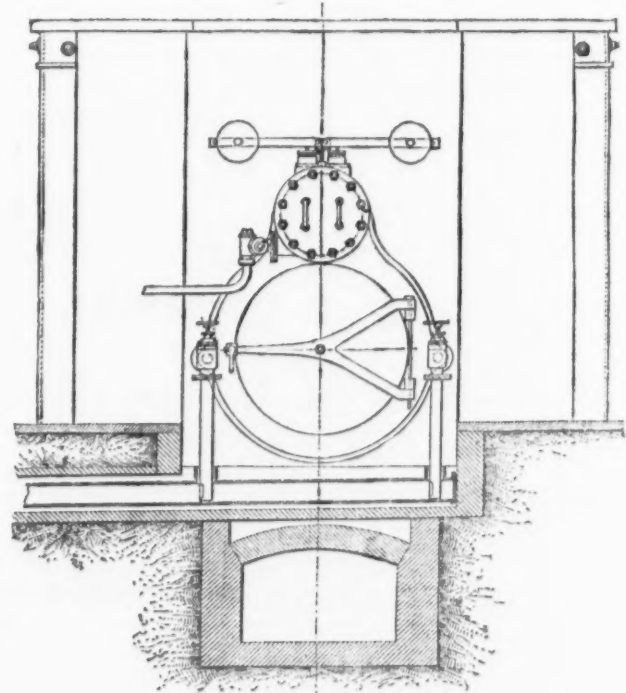


Fig. 5.—View from Fire-box End.

## NEW FORM OF TUBULAR BOILER.

ing united underneath the ash-pit. Threaded stay bolts hold the fire-box sheets to the shell. The sides and crown of the fire-box are flat, and are joined at the top by turning a flange upward all around on the crown sheet. All the flanges of the fire-box are in the same way turned outward into the water, a peculiar arrangement which has given much satisfaction in spite of the apparent opportunity which it affords for catching mud on the crown sheet. All the fire-box seams, it will be seen at a glance at Figs. 1 and 2, are well protected from the action of the fire. Forward of the fire-box there is a combustion chamber formed of three rings, flanged outward, and extending into the barrel of the boiler. In the first ring of this chamber, and next the fire-box, there is a thick fire-brick ring, which is inserted for the purpose of thoroughly mixing the gases. From the combustion chamber to the front end there

tank of the form shown by Figs. 1 and 3, the sides of this internal tank next the fire-box extending up above the water line of the boiler. From the bottom of each side of this tank or feed-water purifier a blow-off pipe extends through the brickwork setting, as shown in Figs. 1 and 5, each of these pipes carrying a suitable blow-off cock. The feed water, entering at this point already mentioned, flows first into this internal tank or purifier, and it can only escape into the boiler by flowing over the side of the purifier next the fire-box. Before it does this, however, it becomes thoroughly heated, and the carbonate and sulphate of lime contained in it, being rendered insoluble, are deposited in the side wings of the purifier, from which they are blown out every morning before starting, the water being allowed to flow as long as it continues muddy. The principle upon which this heater works, and the neat

The upper ends of the bars are hooked on to a suitable cross-bearer of angle iron, while the lower ends simply rest on a cross-bar, the bars being thus perfectly free to expand and contract. The effect of this forming the bars to a catenary curve is that the fuel, instead of sliding down by jumps, slides down regularly. For instance, if it be conceived that the fuel on the grate was replaced by a series of balls, then, owing to the property of the catenary, each ball would be pressed against its neighbor below with equal force, whether it was near the top or bottom of the grate; and it is this equality of pressure which insures the regular movement of the fuel. If a grate of this kind gives perfect results with soft coal, we do not see why it should not be very desirable for anthracite.

The fire door is especially arranged so that the firing of the inclined grate will be easy.

evidently affords great facilities for pricking, &c., and it deserves a trial in this country.

At the upper part of the barrel are provided five small steam-collecting pipes, these pipes being slotted on their upper sides and being all fixed into a casting which serves to connect them with the stand pipe carrying the stop valve. This latter pipe passes up through an opening into the brickwork setting large enough to admit the flange at the lower end of the stand pipe, the opening being closed by a dished cover which fits around the stand pipe, and which has its curved down outer edge immersed in sand contained in a suitable annular channel. This prevents the leakage in of air at this point, but still leaves the stand pipe free to move with the expansion and contraction of the boiler.

As we have said, the boiler is sur-

rounding the event of the fire-box stays requiring attention, while it will be noticed that the arrangement of setting generally leaves the boiler very accessible for external examination.

The particular boiler illustrated has an iron shell and steel fire-box, and it is worked at 80 pounds per square inch, although it is constructed for a working pressure of 120 pounds. It has 753 1/2 square feet of total heating surface, and 16.15 square feet of grate, while the consumption of good Saarbrück coal per hour is 3 cwt., and the evaporation 9.3 pounds of water per pound of coal. *Engineering* speaks of the boiler as being of a most excellent type, and one likely to prove of great value in various situations. There are certainly many ideas in the design well worth studying and adopting. The catenary grate and the internal feed water tank may both be made valuable.



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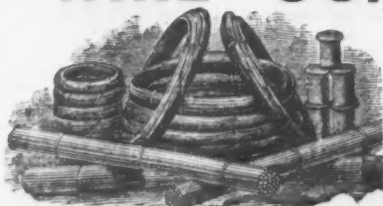
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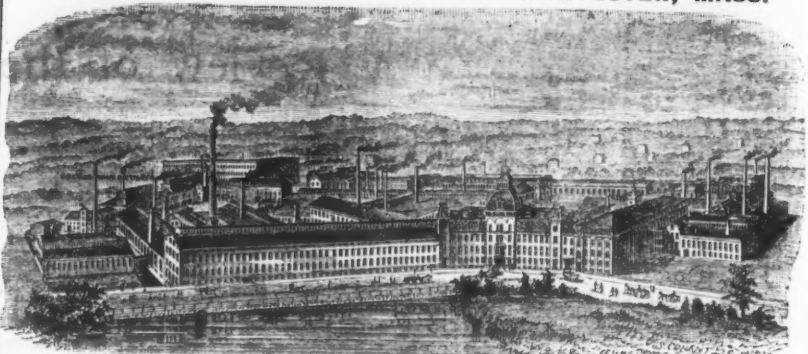
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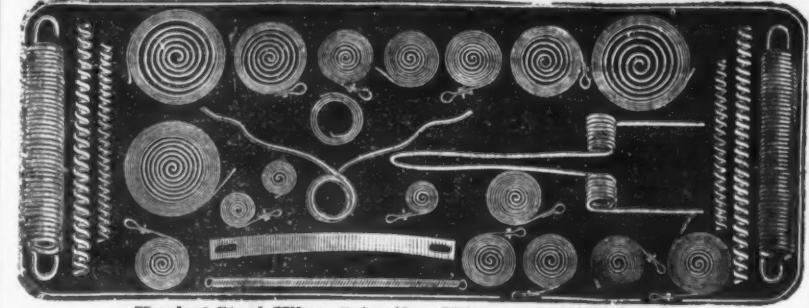
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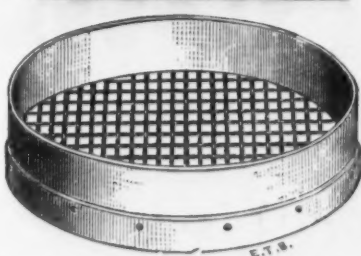
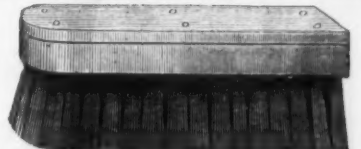
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The Art of Founding in Brass, Copper and Bronze.

BY EDWARD TUCK.

The origin of the art of founding can only be a matter of speculation, extending, as it does, so far back in the past history of the race, a history to a very large extent wrapped in obscurity and mystery. But the marvelous results of the various operations and the immense importance they are to mankind, have caused many in ancient times to assert that the art was communicated to man by the gods. Some, and with a larger share of truth, consider that man, finding by accident that certain minerals by the force of fire yielded a metal, repeated the experiment on other minerals, finding out other metals, and thus ultimately all the differing forms in which they exist in the earth. As late as 1762 a large mass of mixed metals, composed of copper, iron, tin and silver, was melted out of the earth during the conflagration of a wood accidentally set on fire, and various ancient historians speak of metals having been melted out of the earth during the burning of woods in the Alps and Pyrenees.

Copper is occasionally found in nature in a metallic state so pure as to be used for manufacturing purposes, either for making articles of copper or alloys. There are examples of this in the mines of Lake Superior in North America, where large masses of copper have been found weighing several tons. It may, therefore, be considered quite possible that quantities of copper were found in the earth in the olden time, so that the ancients could possess the metal without the necessity of smelting. But, however, this fact must be stated, that where a mass of copper is found embedded in the earth at any depth, it would require a greater amount of skill and mechanical knowledge to get this into working operation than to smelt the ore. Such a mass could not be broken up like stone, but must be cut, and therefore would require tools of particular hardness, and other mechanical appliances, to obtain which requires a greater and more refined knowledge of metallurgy than smelting copper from the ore.

But whatever or wherever may have been the origin of the art, it is quite certain that it originated at the very earliest period of man's history, and has gone down with him along the stream of time to this age. It has had, as all arts have had in varying ages and nations, its rise and decline, which make the investigation of its history a somewhat difficult task. Still, by the aid of researches which have been made among the ruins and relics of past buried ages, we have been able to gather together some facts which help us to form something like a history of the art, very imperfect in many points, yet enabling us to gain some idea of the methods of working and the means by which certain results, which are matters of wonder to us even now, were accomplished.

We have, it is true, in these modern days advanced far, very far, in the metallic arts; but in the great facts and principles we are no further than the men of the past. In the matter of tools and means of production we have advanced so that we may produce in one week as much as they did in one year. But still the fact remains, they accomplished the work, and in the especial matter of bronze we have not yet reached the height of perfection to which certainly they attained.

Pliny and other ancient writers are very far from being correct in their descriptions of the manufacturing processes, and even the translators of their works have added to the confusion, either through ignorance or on account of the poverty of the original language in technicalities, as we find brass in one place, white copper in another, copper in a third, all referred to indiscriminately, whether referring to pure copper or the alloys whitened by the addition of lead, tin, or any other process, although Pliny certainly does describe more correctly the casting of bronze, for he says: "The mass of copper was brought to a liquid state, then was thrown into a third part of old bronze and 12½ per cent. of plumbum argentarium"—i. e., tin and lead in equal parts. We shall, therefore, trace the history of the art of founding, so far as we have been able to gather it from the past history of ancient times and the researches into and about the buried cities, and trace its course down through the ages to the present time.

The oldest reference we find in Holy Writ is in the Book of Job (the oldest work extant), Ch. xxviii, 2, "Brass is molten out of the stone." In the original Hebrew the word is *Nechosheth*, meaning literally copper. This must be so, as brass, being an alloy and not a pure metal, is not smelted, or, as it is put here, "molten out of the stone." The next reference is in Genesis iv, 22: "Tubal Cain, an instructor of every artificer in brass and iron." The same word, *Nechosheth*, is used here, literally copper; but seeing that copper is a difficult metal to work, we believe that the alloy of copper bronze is really meant. We incline to this belief because there is only one other reference to copper in the Old Testament (Ezra viii, 27): "Two vessels of fine copper, precious as gold." And here the same word is used. We find that tin, which mixed with copper forms bronze, certainly was known to the ancient Israelites, as in connection with the spoil taken from the people of Midian, 1452 B.C. (Num. xxxi, 22), they are commanded by Moses to purify the silver, brass, iron, tin and lead, by passing it through the fire. (Moses appears here to mention all the metals then known.) Whether the tin came from India or not, there is no sufficient evidence to prove, but it appears certain that the productions of that land were known in the earliest times, by "the gold of Ophir" being mentioned in Job.

If the Phœnician ships did not actually sail to India, its productions arrived partly by land through Arabia, partly through more distant marts established midway from India by the merchants of those and later times; and we have evidence of their having arrived in Egypt at the early period of Joseph's having been taken there, by the spices which the Ishmaelite caravans were carrying to that land. And the amethyst and other objects discov-

ered at Thebes, of the time of the third Thothmes and succeeding Pharaohs, and which must have been brought to Egypt, argue very strongly that the intercourse was constantly kept up. Bronze, composed of tin and copper, was found in Egypt of the time of the sixth dynasty, 2000 years B. C.

The first work of art of which we have any details in Holy Writ is the Ark made by Moses, and generally called "the Ark of the Covenant." It was also the first work performed by the Israelites as a nation. A large portion of the works in connection with this are of pure gold beaten out with the hammer; and although these show mechanical skill of a very high order, they are outside the scope of our paper.

We read (Exodus xxxviii, 8), "And he (Moses) made the laver of brass, and the foot of it of brass, of the looking-glasses of the women," &c. The word translated "foot" should be, as given in the margin, "cover." This laver, or large basin, in which the priests were to wash, must have been a large work to cast; and it shows a complete and accurate knowledge of the different sorts of bronze for different purposes that the cover should be made of the mirrors of the women, brought by them out of Egypt, and which, containing about one-third more of tin in the alloy, constituted speculum metal; so that the cover of this huge washing basin formed, when raised, a mirror in which the priests could examine themselves before approaching the altar. There were besides this many other articles used in the erection of "the Ark of the Covenant" made of bronze. Dean Prideau gives as the weight of bronze used 10,277 pounds Troy weight. The entire weight of the articles made in the three metals—gold, silver, and brass or bronze—was 14 tons 2 cwt. No one can read over the narrative of that undertaking, viewed independently of the adverse circumstances of the Israelites, wanderers in the wilderness, without perceiving that many among them possessed great skill; some had most probably been among the highest class artisans of Egypt. The ease with which these elaborate works connected with the Ark, as well as the Golden Calf and the Brazen or Bronze Serpent, were produced, show that they had not been employed solely in the labor of brick making while in Egypt, but that in all probability many of them were workingmen in the Egyptian foundries and other public works in which metal articles were manufactured.

Bronze being a mixture of copper and tin in variable proportions, every variation produces a bronze of different quality, more or less suitable for different purposes. One quality will have great hardness and be very brittle—another hard and flexible. One gives a bright reflecting surface when polished, suitable for mirrors—another is famous for its sonorous quality, and is therefore suitable for bells, gongs, &c. Before these properties and differing qualities could have been found out, some length of time must have intervened, as such knowledge of practical facts could not have been obtained until society had gained a considerable advancement in the arts. We are able to show by analyses that have been made of the bronze of the Egyptians and other ancient nations, that it was of such varied qualities, requiring a great amount of knowledge and practical skill as well as pure materials. Consequently these ancient people must have attained the knowledge before they could procure the varied articles. A chisel found by Wilkinson in an Egyptian quarry gave copper, 94.0; tin, 5.9; iron, 1 = 100. A dagger, analyzed by Klaproth, copper, 91.6; tin, 7.5; lead, 0.9 = 100. Bowl or dish from Nimroud, copper, 89.57; tin, 10.43 = 100. Bell analyzed by Dr. Percy, copper 84.70; tin, 14.10, thus showing where sound is required the amount of tin is increased, and where strength is required the amount of tin is decreased. Dr. Percy found also a small casting, in the shape of the fore leg of a bull, forming the foot of a stand consisting of a ring of iron standing upon 3 feet of bronze. A section made disclosed a central piece of iron over which the bronze had been cast. The casting was sound and the contact perfect between the iron and the surrounding bronze, and it was quite evident on thorough inspection that the bronze had been cast round the iron, and not the iron let into the bronze. The analysis gave copper, 88.37; tin, 11.33. No perfectly satisfactory conclusion can be arrived at whether the iron was employed because required in the construction or to economize the more costly metal—the bronze required for the ornamental purpose. We are inclined to the former in this case. Sir Henry Layard speaks of the bronze vessels, which he supposes to have been used in the religious ceremonies, as especially deserving of attention, as demonstrating the skill of the Assyrians in their treatment of bronze. One specimen may be particularly noted: "A thin hollow casting in bronze, which was attached to the end of one of the arms of the throne. This casting had evidently been chased, and for that purpose must have been filled with some substance, such as pitch, which is used at the present time, as in the interior was some black compound which was like pitch and left an earthy residuum, and was probably a mixture of asphaltum and earth." It is quite evident that the Egyptians, at the time the children of Israel were in captivity among them, and even long before that period, were very skillful in working the metals, especially bronze. We have no exact idea of the form of the furnaces or the materials used in their construction, but that they had great facility in constructing such furnaces is evident from the short time taken by Aaron to cast the calf or bull when in the wilderness. So we may presume that the Hebrews had been many of them laborers with the skilled artificers of Egypt, and, when leaving, had taken away their tools and the knowledge of the art in which they had worked with them. But whether the same or similar means were adopted for overcoming the difficulties of founding as in the present day, this fact remains—the difficulties were overcome, and the metals then known were used in abundance, and as pure as we now have them. Wilkinson, in "Ancient Egypt," gives the figure of a smelting or melting operation from one of the ancient monuments. The furnace



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**MANUFACTURERS' FOUNDRY  
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**MOULDING SAND.**

seems only a heap of fire on the surface  
of the earth, and the bellows are two  
large bags filled with air, upon which a  
man is standing with a foot on each bag,  
the aperture of the bag being connected  
with a pipe leading into the fire. While  
the man appears to be putting all his  
weight on one bag to compress the air out  
into the fire, he is lifting up his other foot,  
and at the same time the upper fold of the  
other bag by a string in his hand, by which  
the bag is again being filled with air. This  
apparatus is, no doubt, both simple and rude,  
and if it refers to the ordinary metallurgical  
operations performed by the nation, one  
could hardly suppose that castings of any  
great size could be obtained except with  
much difficulty. Still it shows that the  
methods adopted for getting an intense heat  
were similar to ours, viz., by bellows or  
blowing.

Ordinary bellows are said to have been in-  
vented by Anacharsis the Scythian, but that  
must have been long subsequent to this  
period. Very little can be discovered to  
illustrate the means employed in metallurgi-  
cal operations from the objects found in the  
excavated tombs or from the paintings,  
beyond the use of the blow-pipe and forceps,  
and the concentration of heat by raising  
cheeks of metal round three sides of the fire  
in which the crucibles were placed. Homer  
notifies "that the Egyptians and other  
Asian workmen excel in the manufacture of  
arms, rich vases and other objects inlaid  
and ornamented with metal." Herodotus  
and Helianus both say, "The Egyptians  
drank out of bronze goblets." We find that  
statues, musical instruments, implements of  
all kinds, adzes, axes and chisels, articles of  
furniture, bedsteads and footstools, and  
many other domestic utensils were all made  
of bronze. Also biers, on which the bodies  
were placed after death. The Egyptian  
vases are numerous, and to be noticed for  
beauty of form and the design ornamenting  
them, as well as for the superior quality of  
the material. Those used in the service of  
the temples were especially beautiful. One  
found by Mr. Salt had an elastic spring to  
the cover, and the nicety with which it is  
fitted exhibits evidence of great skill in the  
workmanship.

The sistrum was, par excellence, the sac-  
red musical instrument, and was usually  
of bronze or brass, sometimes inlaid  
with silver. One now in the British  
Museum is entirely of bronze, having a  
hollow handle closed by a movable cover  
of the same metal. The cymbals, or  
clappers, which, when struck together,  
emitted a sharp metallic sound, were of  
mixed metal, probably copper and silver,  
and in shape much resembling those of  
modern times.

It is not known at what time the ancient  
Egyptians began to cast statues and other  
objects in bronze, or how long the use of  
beaten copper preceded the art of casting.  
Many bronzes, however, have been found  
of a very early period. A cylinder with  
the name of Papi, of the sixth dynasty,  
has every appearance of being cast, and  
other bronze implements of the same age  
bear still stronger evidence of having come  
from a mold, all of which date more than  
2000 years before our era. The Egyptians,  
too, appear to have possessed the secret of  
giving to their cast bronze blades a certain  
degree of elasticity, as in the dagger now  
in the Berlin Museum, which probably de-  
pends for this property on the just pro-  
portions of the peculiar alloys used in its  
manufacture, as well as on its mode of  
having been hammered. Another remark-  
able feature in this bronze is the resist-  
ance it has offered to the effect of the at-  
mosphere, continuing smooth and bright  
though buried for ages, and since exposed  
to the damp of the European climate. It  
may be said that the Egyptians had not any  
mines of tin wherewith to produce the  
bronze alloy. It is true that the mountan-  
ous districts of Egypt, between the Nile and  
the Red Sea, produced iron and copper only.  
Copper was also found in Arabia Petrea,  
which district was known to them, and even  
now among the heaps of refuse there we  
come upon the tubes used in the smelting  
apparatus. Mines are mentioned by Agar-  
tharchidas, a Greek writer of the age of  
Ptolemy Philometor, and he gives a curious  
picture of the mode of working these mines,  
which were probably near the coast now  
called Jebel Allaka. For additional evi-  
dence we learn from Mak-rizi, an Arab  
writer, that this region produced silver and  
copper, and tradition names both Egyptian  
Pharaohs and Greek Ptolemies as workers  
of the mines. But, as we have already  
shown, they traded with India, and at this  
time, as well as from Spain, tin could be  
procured there.

The Phoenicians, to whom the art of  
navigation is so much indebted, and who  
carried the spirit of adventure beyond  
all the ancient nations, obtained tin from  
both India and Spain long before they  
visited the more distant shores of Britain,  
and discovered how rich were the mines of  
that metal there. It was worth their while  
to undertake a long and risky journey at  
sea, with possibly no other method of as-  
certaining their course than the stars, from  
the high price they were able to obtain  
for this commodity in Egypt and other  
countries where, as at Sidon, the different  
branches of metallurgy were carried on to  
great perfection. Strabo, Diodorus, Pliny,  
and other writers mention certain islands  
discovered by the Phoenicians, which, from  
the quantity of tin they produced, they  
called Cassoterides, though the locality is  
not given, for Strabo says, "The secret of  
the discovery was carefully concealed;"  
and it is said that a Phoenician trader ran  
his vessel on a shoal and was shipwrecked,  
when pursued, rather than disclose his coun-  
try's secret, for which he was rewarded  
from the public treasury. Strabo and Pliny  
both mention that tin was found in Galicia  
and Lusitania, and further say that in con-  
sequence these countries became a rich mine  
of wealth to the Phoenicians.

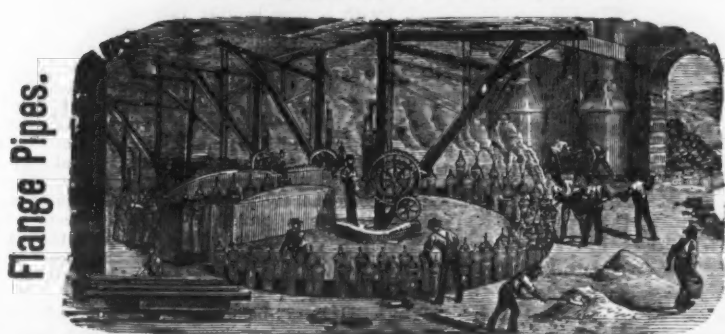
Herodotus describes the doors of the  
Temple of Belus, at Babylon, as made of  
metal, probably bronze. The people would  
be more induced to attempt such work as  
bronze doors for their temples and public  
buildings in consequence of the scarcity of  
good timber suitable for the purpose in the  
land.

The next great work of ancient times of



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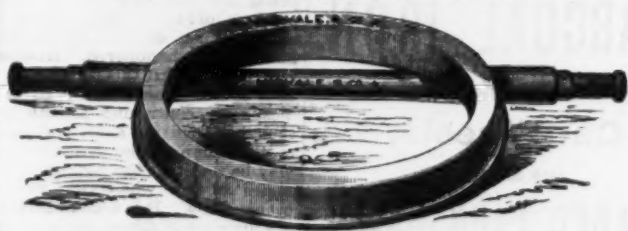
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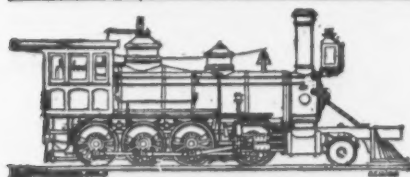
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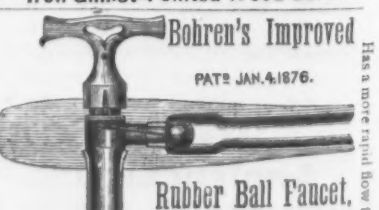
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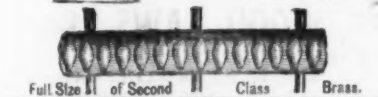
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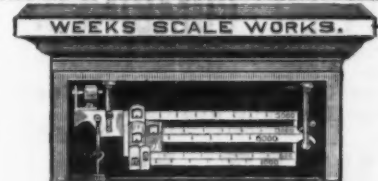
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ANALYSIS.	
Mag. Oxide of Iron.....	75.05
Protoxide of Iron.....	8.3
Manganese Oxide.....	.09
Alumina.....	4.43
Lime.....	1.52
Magnesia.....	.97
Silica.....	14.80
Phosphoric Acid.....	.37
Sulphur.....	.42
Titanic acid.....	.27
Total.....	99.44

We propose to offer the above F. O. B. at Port Morris, N. Y., guaranteed 50 per cent. Metallic Iron.

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Brewster, Putnam County, N. Y.

which we have any details, is the making of the various bronze and brass articles used in the building and fittings of Solomon's Temple, at Jerusalem, 1011 B. C., and this gives a really good and complete idea of the progress made in the art at that period of time.

After the formation of the ark and its various fittings, the Hebrews were not called upon again publicly to exercise their skill in metal work. The 40 years of desert wanderings rendered such quite unnecessary; and as all those that came up out of Egypt died in the wilderness, in all probability with their death passed away much, if not all, the skill and ingenuity then shown, except for weapons of war and possibly implements of agriculture. They (the Hebrews) for some centuries were so much engaged in taking possession of the land they were to inhabit in wars and fightings, that the ordinary arts of civilized life were not and could not be cultivated; so that, notwithstanding the enormous wealth they had accumulated in the time of King David, yet when Solomon, his son, began to erect the Temple (which was a work their forefathers, when they left Egypt, could have accomplished without assistance) there were none among the people who could do the skilled work necessary in casting and working the various metals. In consequence, Solomon had to negotiate with the King of Tyre to send him men and materials to do the work. "Send me, therefore, a man cunning to work in gold, in brass, and in iron," and that can skill to grave with the cunning men with me whom David my father did provide" (referring to some skilled workmen whom the same king had sent to King David at an earlier period).

Singularly enough, the man sent by the King of Tyre as chief of the workmen was himself of Jewish descent on his mother's side, and had come of a family of metal workers, for we read, "his father was a man of Tyre, a worker in brass." This man directed the whole of this department of the work. The vastness of the quantity of bronze or brass used we are unable to determine, for we find (1 Kings vii. 47) "Solomon left all the vessels unweighed, for they were so many, neither was the weight of brass found out."

It is impossible for any one to read the graphic account given of the Temple construction in the Book of Kings, especially of the productions in metal, and not be amazed at the great variety of the work done, and the beauty and finish with which it must have been executed, as well as the great quantities and immense castings, which would require the highest mechanical skill and knowledge.

The two bronze pillars which were fixed up in the porch of the Temple must have been splendid specimens of workmanship. Taking the cubit at the generally recognized measurement (21 inches), the pillars, inclusive of the capitals, will have measured over 40 feet in height and 7 feet in diameter, and the weight of the metal would be from 23 to 28 tons. Another question arises in connection with these pillars; if they were hollow, as Whiston in his translation of "Josephus" considers they were, it follows that the use of cores must have been known and practiced at this time, although this invention is ascribed to Theodorus and Rhaecus of Samos at a much later period; but this may be only another instance of the knowledge of certain kinds of manufacture being lost and rediscovered at some later period.

(To be continued.)

## British Iron Trade Prospects.

The Colliery Guardian says: Fluctuating more than most of our greater industries, and with more violent bounds, the course of the iron trade during the past few months has known less than its usual movements. Production has been steady, but there has not been that tendency to increase the output which was known a year ago—on the contrary rather. Despite this, the great declension in the demand for crude iron from the United States has forced up stocks of pig iron so rapidly that the course of prices has been, on the whole, downward, and the profits of the producers, even under the best circumstances, have been minimized. The tone of the trade may be best gathered from the description of the highest authority, who summed up a private expression of his opinion in the words, "continued immense production and very low prices." The buyers of iron are receiving the benefit of this, and in the cheapness and the consequential extension of the use, it may be that there is the reason for the vastness of the output. But there is reaction also of the immense stocks of pig iron that have now accumulated, especially in the two great crude iron producing districts, and hence it is that the position of the maker of pig iron is not one that is at the present time very promising. Nor can there be seen in the immediate future any early indication of great change for the better. It is true that in the last few weeks there has been a much better demand for crude iron from the United States, because the stocks of imported iron that had there accumulated last year have been very greatly brought down, but there is as yet nothing like so vast a demand—or the probability of one—as that of 18 months ago. Concurrently with the increase in the demand from the United States, there has been an increase in the prices of imported iron there, and it may now be accepted as a fact that for some kinds of our crude iron in the United States a permanent market may be looked for, even with the heavy duties that tell against us. But the relief to the British ironmaster from this source does not promise to be permanently large for the present, and hence, while it is to be accepted as a relief, it cannot be said to be enough to take that margin between the consumption and the production which is so weakening to the tone of the market. And it cannot be said that any of the other sources of consumption show signs of an early increase sufficient. It is true that some look to the growth of the steel trade at home to take up that margin of pig iron, but if there is that expected growth early, it is probable that it will be at the expense of the malleable iron trade, and thus the consumption of pig iron will not be

materially changed. With the cheapness of iron, and with the constant growth of the railway system and of iron and steel vessels, there is an ever increasing use of metal, and it is to this—slow, but sure, in an era of moderate prices—that we have to look for the advance of the consumption of pig iron to the rate of the present production.

Meantime, the era of low prices of iron that we are now in, witnesses a twofold effect—it sees that growth in the consumption, and it has also a tendency to lessen the output, because some of the older furnaces, or those which work dearer, cannot produce iron at a profit at the present prices, and hence, after they have stocked their output for a time they must reduce it materially. This twofold process is progressing, and it is from it that the true relief to the iron trade will come. It is notable that it is a relief that is based on sound commercial principles, and that it does not depend upon any artificial means, such as a combination of ironmasters to keep up prices by blowing out a number of furnaces, some of which may have been working at a profit. That relief is slowly arrived at, but it is surely drawing nearer, though it may be that when the production is reduced to the level of a normal consumption, the effect of the immense stocks of pig iron that have accumulated will be the most keenly felt; and as now the cost of the production of pig iron fluctuates with the price, and that to a considerable extent in the prices of materials and the rates of wages, owing to the sliding scales, it is also to be expected that these slow working scales will bring relief to the ironmaster until the tendency of prices shall be upward. In the immediate future, therefore, it is not likely that the prices or the prospects of the pig iron trade will be greatly modified, but the causes are now at work that will bring about a material change for the better. These causes, like all that arise from natural sources in trade, are slow in their movement, but sure, and hence there are all the probabilities of slowly improving prospects in the iron trade. They may show themselves first in the hematite branch of that trade, for it is in that branch that the demand shows itself strongest at the time, and it is for that that the American orders are being most freely received. Allowing, therefore, for the variation in the demand that the growing preference for steel may give, it may be accepted as a probability that, with a growth of the trade such as indicated by the traffic returns of the great railways, there must be an enlarged consumption of iron, and with it a general improvement in the whole of the iron trades.

## Tests of Constructive Material.

One of the most interesting exhibits, both to the engineer and mechanic as well as to the general visitor, at the Fair of the Massachusetts Charitable Mechanic Association now in progress at Boston, is that sent from the Watertown Arsenal. The exhibit consists of materials which illustrate the results of tests made by engineers in the service of the government, upon a machine specially constructed for the purpose. The arrangement of the exhibit is such that each article tells its own story, while those persons who are sufficiently interested to desire the particulars may learn them from a pamphlet near at hand. The exhibit consists of three groups of objects, which have been ruined respectively by tensile strains, bursting strains and compression. One of the objects most likely to attract popular attention is a steel wire cable of the kind being employed in the East River Bridge. The diameter of this cable is 13½ inches, and the strain to which it was submitted was 150,000 pounds, or 75 tons. The cable itself remained intact with this severe test, but the ball of the socket parted, which shows, like many others of the Watertown experiments, that in constructions of this class the weakest point frequently lies, not in the cable itself, but in its fastenings or fittings. A hammered iron bar 5 inches in diameter was broken by a tensile strain of nearly 725,000 pounds, or 36,000 pounds per square inch. Under this tension the bar parted with a loud report. The fracture shows a crystalline structure. A smaller wrought iron bar was broken asunder by a tensile force of 57,340 pounds per square inch. This bar drew down at the place of fracture, and shows a fibrous structure at the break. In the group which contains specimens destroyed by compression, two iron columns of different forms give some idea of the relative value of the shapes shown in supporting great weights. A lattice iron column some 10 feet long, of a pattern quite familiar to all who are acquainted with bridge work, was ruined by a pressure of 574,500 pounds. A circular flanged column, known as the "Phoenix" pattern, and of much smaller size and weight, sustained nearly 50,000 pounds more than the weight above given. Tests of this kind have determined definitely the value of the latter form, but its liability to deterioration from oxidation upon the inside detracts somewhat from its value in practical use. An 8-inch column of the "Phoenix" pattern which has been subjected to a test for compression, shows, by the perfect symmetry of its present crushed form, how perfectly it is adapted for supporting weights.

A much-needed lesson to builders is splendidly illustrated by pine columns, which have in some instances supported remarkable pressure. The first of these columns, originally 12 feet long, yielded to a pressure of 190,000 pounds, the weak spot being a large knot, which acted as a wedge and caused the destruction at less than the proper figure. Another of these columns is a stick 12 feet in length, tapering from about 7½ inches to nearly 6½ inches in diameter. This stick, being practically perfect, has shown its weakest point to be at the smaller end, for it is at that point that the crumbling of the fibers has taken place. As an argument against the prevalent custom of turning down wooden columns at the end, this test stands unquestioned. A seasoned hard-pine girder 11 inches square and 10 feet long, when tested, bore the astonishing load of 751,000 pounds—a conclusive proof of the value of such timber for columns.

As an example of bursting strain, a mode



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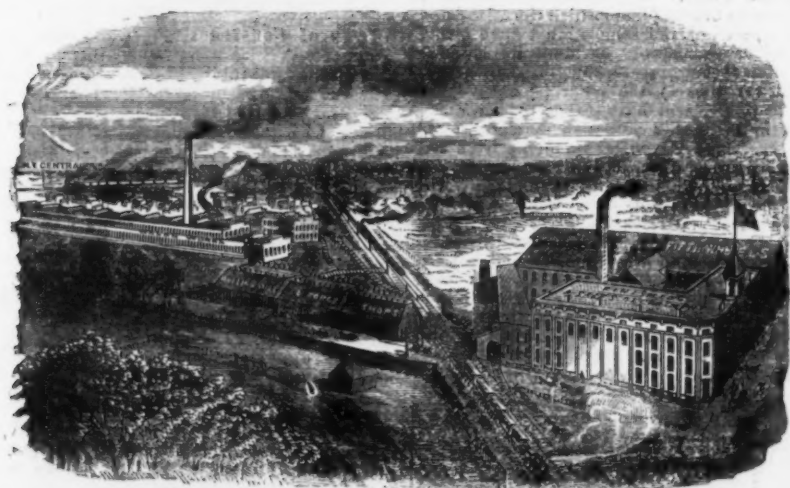
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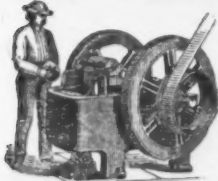
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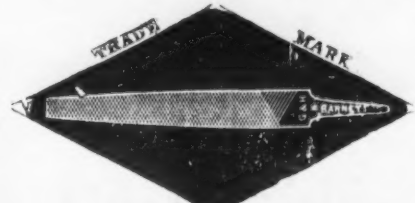
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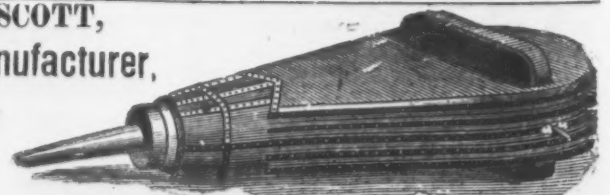
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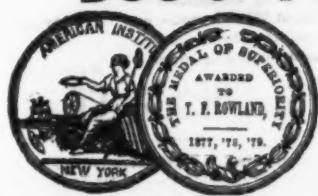
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one-third size of the breech of a 10-inch cannon is shown in the center of the section. This cannon was partly filled with beeswax, and a close-fitting steel plug was forced into the aperture. Under a pressure of 599,000 pounds, the model, being a stout casting 2 feet long by 11 inches outside diameter, was fractured in every direction. Several other interesting tests of steel bars, cast bars, boiler plates, &c., complete this display. It is a graphic method of showing facts that are of interest to every thinking man. It is a popular presentation of facts frequently published in technical journals, but not easily accessible to the average reader.

### The New York Steam Company's Operations.

The upturned pavements in Greenwich street, near Cortlandt street, the heavy iron castings seen here and there, and the massive fire-proof building in process of construction near by, indicate something going on of an unusual character. The building referred to is on the site of the old Pacific Hotel, and though little more than the massive foundations can as yet be seen, the arrangements indicate preparations for the setting of boilers, the whole being designed to generate steam on a large scale for distribution through the city. It is here that the New York Steam Company is establishing itself, as well as at various points throughout the city, from river to river, and from the Battery to Central Park. At ten different points, or centers of distribution, representing as many districts, each designated by letters of the alphabet, steam will be made for manufacturing as well as domestic purposes. The president of the company, Mr. W. C. Andrews, was found at his office, No. 16 Cortlandt street, but gave information with some reserve, as the company, he remarked, sought no notoriety. They had a capital of \$7,500,000, and there was no stock for sale. The system is what is known as the Holley system, in conjunction with other patents, and the object of the company is simply to do on a large scale that which is at present done by individuals, furnishing steam as power for machinery and elevators, as well as for cooking, heating and other domestic purposes.

Meters will indicate the quantity of steam used, and the charges will be such as to afford strong pecuniary inducements to connect with the steam mains laid down in the streets. Each of the ten stations furnishing steam will represent a square mile. The lowest down-town station will be at the foot of Broad street, another will be near the St. Nicholas Hotel; two or three more will be on the East River side, while the factory for repairs is located on Eighteenth street, between Avenues A and B.

In regard to the new building in Greenwich street, known as Station B, it may be remarked that it will be beyond question the strongest structure in the city. It will be 100 feet high and is to be divided into four stories, each floor being made completely of iron, in order to diminish the danger of fire. The boilers producing the steam will be tubular, of the Babcock and Wilcox type, each floor being provided with several, representing an aggregate of 15,000 horsepower. The steam mains consist of 8-inch wrought-iron pipes, cased in boxes of wood, the space between the two being filled up with mineral wool. These casings of wood are thickly coated with tar, being, moreover, covered with a layer of felt, thus producing an almost perfect non-conductor of heat. The cost is to range from \$50,000 to \$100,000 per mile, and it is expected to have about two or three miles in operation at the end of a few months. The building on Greenwich street will be provided with a chimney 200 feet in height, this height being necessary to produce sufficient draft for the fires on the top floor. An elevator will also be provided, and the fuel will be stored in the top of the building and come down through spouts when required.

The street mains are furnished with gates or valves (slide valves) at suitable distances, in order to shut off or turn on the steam supply as occasion may require. In regard to the size of the mains, it may be observed that larger dimensions will undoubtedly be adopted as soon as the demand for the steam will warrant such a course. The supply pipes leading from the stations into the street will be inclosed in brick conduits and packed with non-conducting materials, as in the case of the street mains.

### Master Mechanics.

A correspondent of the *National Car Builder* writes to that journal on this subject as follows:

It may well be doubted whether there is any class of men in this country whose influence is so great in their respective spheres and who are at the same time so undervalued and overestimated as railway master mechanics. In most other professions and pursuits in which a certain amount of technical knowledge is necessary, as well as a preliminary course of study is deemed indispensable. That the advantages of such a preparatory course are not as a rule possessed by the class referred to, is due to the fact that the railway system has been developed too rapidly to allow of the requisite technical training to meet the emergency.

Ask the average master mechanic of today why the frame of a locomotive is made of a particular size, why a smaller size would not do as well, or how he would determine the size of a frame for a larger or smaller engine, and the chances are that we should hear some pretty tall guessing. Or, if we ask an average master car builder the same questions with respect to a car sill, there will in all probability be the same kind of guessing. But if a civil engineer is asked how he gets the size of a compression member or a tie in a bridge, he at once begins to figure, and the result will be pretty sure to stand fire, because his calculations are based on a knowledge of elementary principles. When a new engine is to be built, the master mechanic not unfrequently casts about to see what others have done, or are doing, or he follows the directions of his superior officers, who know little or nothing

about mechanics or motive power. If a tender truck is to be made, does he go to work and determine the strains the truck must bear, and proportion the parts accordingly, basing his calculations on a knowledge of the strength of the material, and the strains to which it must be subjected? Perhaps so. Or, he may call his draftsman and request him to run over to the X Y Z shops, take a good look at their tender-trucks, and get up a drawing just like them.

The directors of a road want a new passenger engine built that will pull the new Salt River express train at the rate of 50 miles an hour. Does the master mechanic in such a case take from the shelf a few select authorities on locomotive engineering, and demonstrate that the resistance increases as the square of the speed, and make calculations for a proportional increase of cylinder and boiler power? Does he estimate the tractive force of the new engine, and know beforehand whether it is possible for it to perform the work? Or does he tell his draftsman to get out the drawings for a new engine, say, 17 x 24 cylinders; boiler, 50 or 54-inch shell, with plenty of flues; 5½-foot drivers, with 6 inches more speed than for a 51-inch boiler, and a good valve motion? However this may be, the engine is built and makes her trial trip; but when she gets down to regular duty it is found that the express train pulls too hard, or that the track is in bad condition, or something of the kind. Anyway, she never makes the 50 miles an hour.

This, I aver, is no exaggeration, nor is it surprising when it is considered that there is no standard or course of preparatory study, and but little opportunity for master mechanics to learn what is being done in other shops than their own. When new and strange conditions arise, the lack of technical knowledge leaves no alternative but to copy, if there is anything to copy from, or else resort to guessing. In marine and first-class stationary engine work every part is subjected to the most careful analysis and is correctly proportioned. The American locomotive, as a type, has been perfected by our large contract shops, where the best talent is brought into requisition. The fact is that four-fifths of the improvements in locomotive and car work originated with outsiders, who are in no way connected with railroads. One manifest drawback to the efficiency of master mechanics and car builders is that they are subordinate to higher grades of officials who are not mechanical men, and who expect the heads of car and locomotive departments to become accomplished experts in their position by simply learning the machinist trade, then becoming a gang boss and then a foreman. What is wanted in this country is a school where young men, after learning in a railroad shop as much as an average foreman knows, can enter and receive a mathematical and technical training. Then we may look not only for an improvement in the economy of the American locomotive, but an increase of the power, capacity, remuneration and responsibility of railway master mechanics.

### Excessive Railway Building.

The *Railway Age*, after noting the rapidity of current railway extension, says:

This enormous increase of railroad mileage calls for a large force of men and an almost fabulous amount of material. The demand of the new roads, together with the requirements of older ones, has crowded all manufacturing establishments beyond their fullest capacity, in spite of their increased facilities and the erection of many new works of large size, as, for example, those springing up along the Calumet region near this city. Even with this increase, nearly all concerns engaged in railroad manufacturing have orders booked for a large part of 1882, and some are even making contracts for 1883. The time of prosperity is supposed to be the period in which to make a provision for a darker future, and it may be well to glance ahead and discover any possible elements of instability in the volume of business now moving. The fact is established that at the first stroke of trouble in business matters a large amount of miscellaneous traffic suddenly vanishes. In the State of Illinois the volume of business moved on many lines was not during 1874-5 more than one-third of the amount in 1870-1, with the same general character of crops and the same condition of settlement in the country passed through. In case of any future trouble, is there any guarantee that the same process will not be repeated, leaving the roads in a similar condition as before? Such having been the state of affairs in an old productive and comparatively well settled country, what must we expect from many lines now building upon the outskirts of civilization when the present volume of business pays but little over the cost of operation. Any reaction would retard the development of the country, and the effect would be as in 1875-6, complete stagnation, so far as the roads are concerned. It is a notorious fact that a majority of the large roads now in existence are composed of lines which have been bankrupt, and in some cases two or three times. Each of these movements represents loss of capital to those who originally put their money into the enterprise. This is a fact that many who are now putting their means into new "trunk lines" will do well to ponder. Their roads may be remunerative in time, but only after their interest and capital invested have been wiped out. History repeats itself in business as well as in the affairs of nations, and the retrenching process is sure to come up in the future as it has done in the past. The air is full, at the present time, of rumors of wars between some of our large lines, involving numerous extensions of road by each into territory already well taken up by competing lines. The temptation is also great, in times like the present of easy money, to build roads more for the profits derived from their construction than from any needs of the country through which they pass, or any reference to their condition for money-making in the future, and it is safe to assume that more or less of such building is now going on. Such roads are always a source of loss to all interested in them except the original builders.

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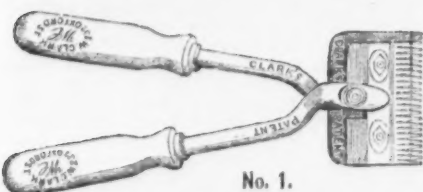
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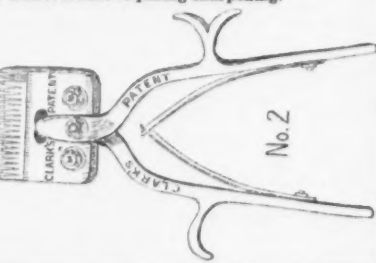
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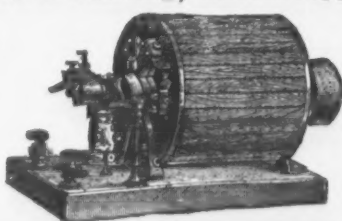
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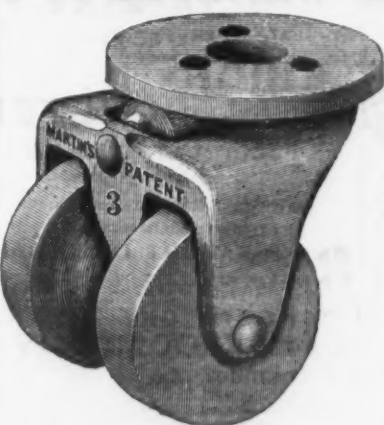
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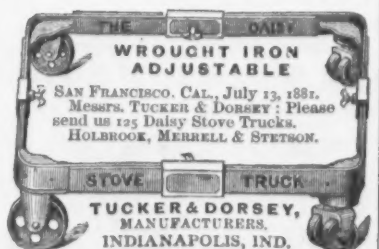
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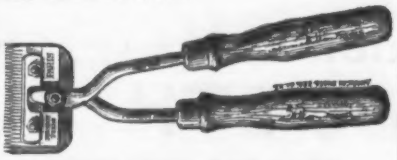
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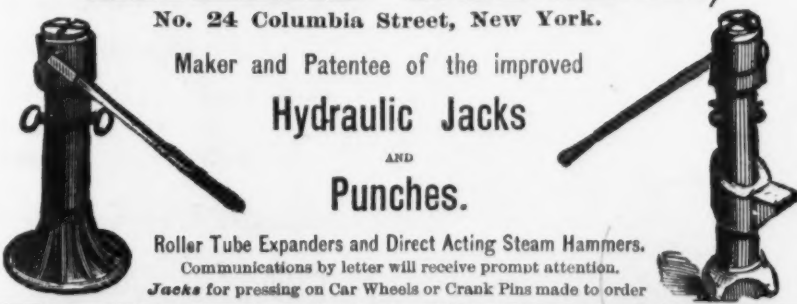
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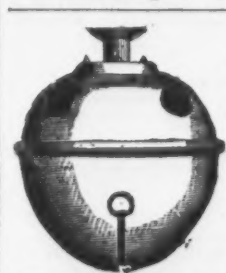
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MANUFACTURERS' AGENT,

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Representing in the Dominion of Canada several American Manufacturers, is ready to accept further Agencies. Satisfactory references.

less mileage greatly complicates affairs, as a large number of impecunious roads, sharply competing for business that would only be enough for part of them, seriously injure their more solid neighbors. The daily press has begun to sound warnings in this direction, especially as regards the numerous undertakings in Texas, Mexico and the Territories, and the very fact of danger being anticipated may modify the violence of the blow when it falls. That there is much solidity in business affairs at present there is not a doubt, and the prospects seem fair for a long-continued season of prosperity; but the more we watch for and guard against any causes of instability, the longer such a desirable condition will continue.

## INDUSTRIAL ITEMS.

### NEW HAMPSHIRE.

The new foundry of the Concord Axle Company has been opened for business. The main building is 140 feet long and 50 feet wide, with two wings on the east side to accommodate the cupola and the ratters, and is very heavily timbered and thoroughly built. Extensive improvements and additions are also being made in the machine shop and forging department of the axle works, and the canal which conveys the waste water to the river is being reconstructed in the most thorough manner, walled and covered with granite. Over this will be the new addition to the machine shop.—*Boston Commercial Bulletin.*

The Manchester Locomotive Works are turning out on the average a locomotive about every two days, or 12 a month.

### VERMONT.

The Pittsford Furnace of Messrs. Naylor & Co., at Pittsford, is out of blast for repairs, but will blow in again shortly.

### MASSACHUSETTS.

The South Boston Iron Company are reported embarrassed, some of their paper, indorsed by Mr. William Prescott Hunt, president and treasurer, having been allowed to go to protest on last Saturday. Recent advices give the following particulars regarding the failure: This extensive establishment was founded in 1809, and has done a large amount of United States Government work, mainly heavy ordnance for the navy and forts. The company have now on hand contracts for the Navy Department aggregating \$200,000. In addition, the company have claims against the government of \$250,000 for work done some time back. The failure of the government to remit this sum is stated as one of the causes of the suspension. Hunt is connected with and largely interested in prominent coal and iron interests in Ohio, being president of the Hocking Valley Iron Company, and heavy drafts upon his capital from these industries was the immediate cause of the embarrassment. Hunt has been for the past six years president of the Atlas National Bank of this city, president of Forbes Lithograph Mfg. Co., also in the Manufacturers' Insurance Co., and one of the largest owners and directors in the Boston Lead Mfg. Co., besides having large interests in other enterprises. The liabilities of the company and Hunt, outside mortgage indebtedness on the property, will aggregate in the neighborhood of \$300,000, the greater portion of which is the company's debt. Hunt's unsecured personal debts are said to be merely nominal. The company and Hunt represent property which, at the lowest valuation, would realize more than double the amount of all claims against them, and this is outside of the money due the company by the government. The probable result of the present condition will be the reorganization of the company on a sound basis, with a larger capital stock. The company will not shut down. The Boston Machine Company, in which Hunt is a large owner, will not be affected. According to the latest report, the company has realized an amount from sales of real estate sufficient to meet all maturing engagements.

We hear that the Parker Mills, at Wareham, are to be started up again.

The firm of Goddard & Shaw, machinists, of Brockton, have recently moved into Perry's Block, Center street, near the depot. The new quarters occupy two stores, 100 by 40 feet, with an L in guide rounds, 45 by 35 feet, and the firm claim one of the finest machine shops in the State. They make a specialty of machinists' tools and needle machinery, and with their increased facilities are enabled to turn out work promptly and in a first-class manner.—*Boston Commercial Bulletin.*

The Washburn Car Wheel Works, at Worcester, have just finished putting in six new steel crucible furnaces at their shops, more than doubling their former capacity. The company have also placed a new 25-inch cylinder on their striking hammer. The latter has a blow power of 6 tons, and is used in cutting out the center pieces from the steel ingots as they come from the furnace.

The Mason Machine Works, Taunton, have received the order of the Sagamore Mfg. Co., Fall River, for 144 Foss & Peavy cards, railway heads and looms for their new mill. A 1000 horse-power Harris-Corliss engine will be used.

### RHODE ISLAND.

The Franklin Foundry, Providence, have received orders for the greater part of the machinery for the Central Falls Manufacturing Company and J. M. Worth Manufacturing Company, of North Carolina, both new mills. The orders were placed by James O. Pickard, superintendent of the Randleman and Naomi Falls Manufacturing Companies. The carding in both mills will be done by Foss & Peavy cards.

Eighteen locomotives were turned out at the Rhode Island Locomotive Works, at Providence, last month, for the Chicago, Milwaukee and St. Paul Railroad, and three for other companies.

### CONNECTICUT.

The Hartford Engineering Company is so pressed with orders that it has doubled the number of its workmen.

Wheeler & Wilson's sewing machine factory, at Bridgeport, was damaged by fire on Saturday last to the extent of from \$8000 to \$10,000.

Holmes, Booth & Haydens have added a

new casting shop, 60 x 60, and a new stack and chimney to their glass works at Waterbury, and have, besides, made a number of other improvements.

### NEW YORK.

Messrs. Bradley & Co. took the first premium, a silver medal, at the Cincinnati Exposition, which closed on the 7th inst., for the "best power hammer."

The Parrott Iron Company, makers of the well-known brand of "Clove" pig iron, have transferred the agency of their iron from Messrs. T. J. Pope & Bro. to Messrs. Stevenson, Peirson & Co. It will be remembered that the last blast of the Clove Furnace is the longest on record. She has been fully repaired during the past four months, and is now in blast.

The Chatham Furnace Co. have their furnace out of blast and are putting in a new hearth. This furnace is the old Beckley Furnace. They will blow in again shortly.

### NEW JERSEY.

The Chester Furnace in Morris Co., leased by W. J. Taylor & Co., is at present out of blast, but will soon start.

### PENNSYLVANIA.

Hoopes & Townsend, of Philadelphia, have lately shipped a quantity of their specialties for exhibition at Atlanta. The shipment was made via Pennsylvania Railway, from the new depot at Fifteenth and Market streets, in a box and platform car. Conspicuous placards announced that the cars contained "Hoopes & Townsend's exhibit of bolts, nuts, rivets, &c., for the Atlanta Exposition." The material weighed 26,200 pounds. The case is the same as was exhibited at the Centennial Exhibition in Philadelphia in 1876, and at Paris, 1878. The arrangement of the articles will be different, however. There will be a private office, 18 x 5½, attached to the exhibit, and all will be under the personal superintendence of Mr. Hoopes.

F. F. Adams & Co., Erie, manufacturers of the Keystone wringer, have rebuilt and recently removed to their present extensive works on the site of their former establishment, which was destroyed by fire last winter. Further additions to the works are being made, which will be completed shortly.

The Montour Iron and Steel Co. have been making an average of \$75 tons No. 1 R. R. iron per week for some time past. They are now tearing down the oldest of their three furnaces.

Columbia Furnace No. 2, of Grove Bros., Danville, has been out some months. She blew in about two weeks ago, but chilled and was compelled to blow out again. She is now nearly ready to go in. No. 1 is in blast and doing well.

Two of the Pioneer Furnaces of Atkins Bros., at Pottsville, are now blowing. The third stack is now out, but is ready to blow in.

The Connelleville Machine and Car Company shipped another car load of bridge iron to the Pittsburgh and Western Railroad last week.

The employees of the Reading Hardware Company are kept very busy at present, and are making overtime at the rate of three nights per week.

Wm. Painter's Danville Furnace has been in trouble lately on account of a scarcity of water, causing the loss of the tuyeres and the consequent chilling of the furnace. She is all right again.

O. B. Keeley & Co. have erected a temporary shedding over the molding room of the burned works in Spring City, 128 feet long by 30 feet wide, and will put to work about 30 molders at once.

Temple Furnace, in Berks County, has been out of blast since July 6, being repaired. A new lining and hearth have been put in and other improvements added. The dimensions are now 55 x 14. The company will put her in blast shortly, and expect to make 250 tons No. 1 foundry per week.

Stack No. 1, of the Dunbar Furnace Co. is making over 80 tons of metal every day. The ore used is of foreign importation, the company having recently purchased 10,000 tons. It is received at the Baltimore harbor.

The Phoenix Iron Company, Phoenixville, has just succeeded in rolling a bar of what is known as "1½-inch guide rounds," which, after the crop ends had been taken off and trimmed ready for the market, measured 65 feet 5 inches. This is the largest bar of that diameter ever rolled in any mill in the world. Two new 18 inch trains, three-high, are being made for the company's new mill at Phoenixville. It will take several months to complete them. When erected there will be four roll trains running. An additional gas producer will be built, plans for which have already been made.

The repairs on the Emma Furnace, of the Logan Iron and Steel Company, at Lewistown, are nearly finished, and she will blow in very shortly, if she has not already blown in. The stack has been raised 6 feet, and a new engine and additional hot blast put in.

Petersburg forges, owned by G. M. Cresswell, have been leased by the Messrs. Eichelberger, of Hopewell, Bedford County, and will be put in operation immediately. A force of workmen will commence the necessary repairs this week. The forges were formerly owned and operated by J. H. Hunter & Co., and have been idle for a number of years. They were built many years ago by Dr. Peter Shoemaker. The Messrs. Eichelberger have lately put Hopewell Furnace in blast. They propose to work its product of metal into blooms at the forges.

The Norristown Furnace of Hooven & Son is out of blast, but is getting ready and will blow in very soon.

The Redstone Coke Works have shut down in order to make some necessary improvements; among others, a new engine will be put up in addition to the large one now in use.

Bechtelsville Furnace, which went out of blast a short time ago, is to be put in order at once, and the probabilities are that the furnace will in a short time be put into blast again.

The Lebanon Rolling Mill, which has been lying idle for the last week or more through the breaking of the large shears, will start up this week. The furnaces and mill have been repaired.



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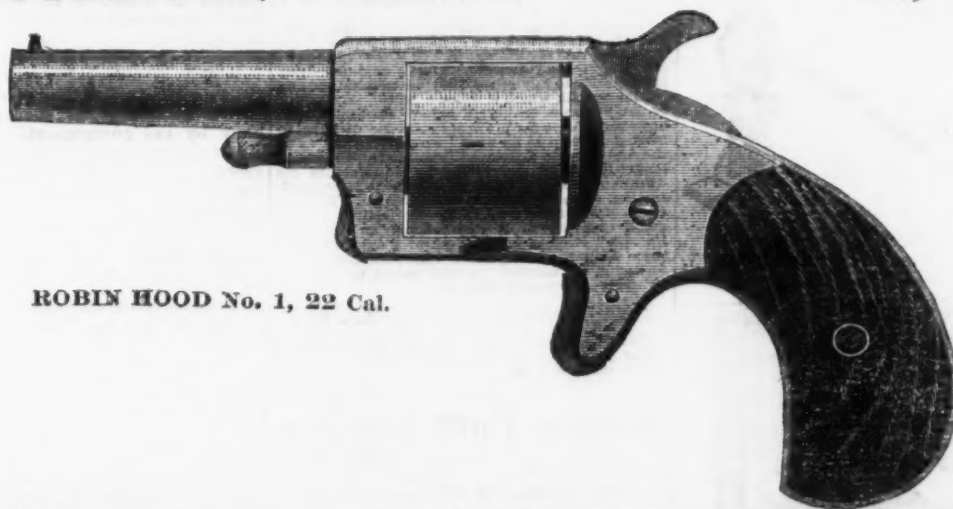
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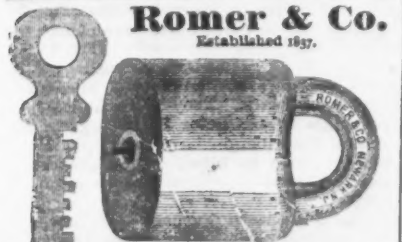
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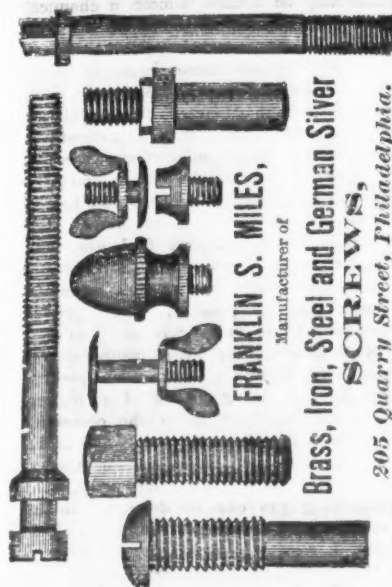
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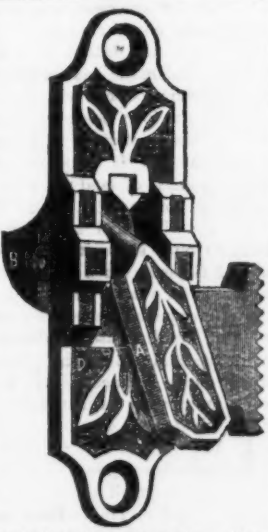
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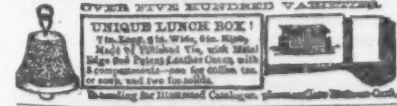
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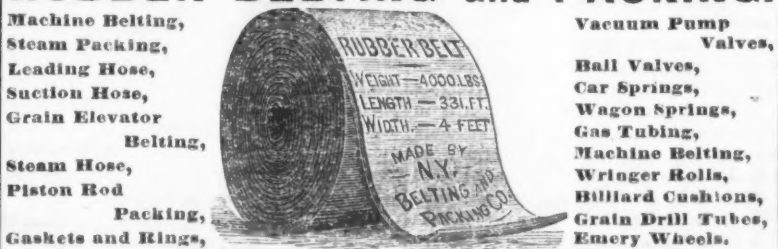


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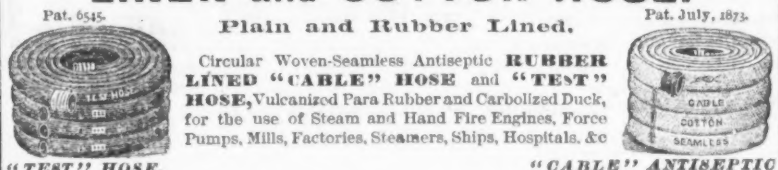
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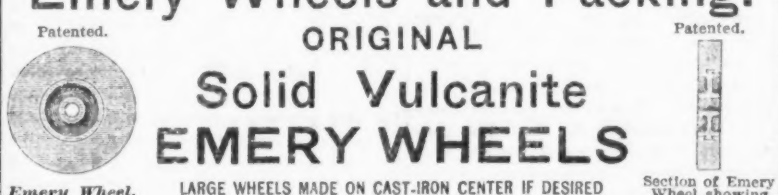


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Send for Pamphlet and Price Lists.

## PHOSPHOR-BRONZE.

The Indiantown Gap Silver Mine is 85 feet deep and 16 feet square. A large engine is used to force pure air down the shaft. The mines are very wet, one barrel of water being pumped out every minute. The ore was recently assayed and yielded \$28 to the ton. They have recently struck a hard rock, and Superintendent Williams claims to strike the rich ore directly under this rock, which is about 5 feet thick.

Ringgold Furnace has been working badly and was blown out, but will be put in again very soon.

The new rolling mill of J. H. Steinbergh, in Reading, will soon be ready for operation. Blast Furnace No. 1 of the Reading Iron Works will probably blow in some time this or next week. She is now being repaired.

Lemont Furnace, which has been banked up for about a week owing to the insufficiency of water, will be started up this week.

We hear that a furnace at Boiling Spring, Cumberland County, is rapidly approaching completion.

Work is very brisk at the car shops of the P. & R. Co., in Reading, 826 men being employed. This is a larger number than ever at work there before. The repairs have commenced working 15 hours a day.

## PITTSBURGH AND VICINITY.

Mr. P. H. Laufman, of the Apollo Iron Works, has received a letter from a Memphis merchant, which would seem to imply that there may be a new and wide field for the product of our sheet iron mills. The writer states that the old cotton bale covering of hemp is open to serious objections. It admits moisture and sand, and permits waste of the inclosed cotton. Its cheapness alone recommends it. At the suggestion of a number of cotton handlers, the gentleman writes for quotations on No. 30 sheet iron. One of those interested owns a patent covering the use of this material as a cotton bale covering, and at the Atlanta Exposition, will show such a device. The letter goes on to state that each bale will require a sheet 76 x 41 inches, weighing 22 pounds. The cost of this will be but little more than hemp, and the advantage gained is evident. The possibilities of this scheme can be determined when it is remembered that the crop of cotton is 6,000,000 bales, and to cover this would take 66,000 tons of sheet iron, representing, at \$100 per ton, \$6,600,000.

McKee & Bros., glass makers, have all their furnaces at work and have plenty of work for them to do. This firm are having an excellent trade this fall.

The standard gauge locomotives, ordered by the Pittsburgh & Western Railroad Co., are being built at the Pittsburgh Locomotive Works, and will cost \$150,000.

Bryce, Walker & Co. are running all their glass furnaces, and are busy at work making up for lost time. Everything at this house goes on smoothly.

## VIRGINIA.

Low Moor Furnace made 616 tons of pig last week, and is in a fair way to work up to 100 tons a day.

## WEST VIRGINIA.

The Standard Nail and Iron Co., of Clifton, have made an addition of 15 new machines to their working capacity, having now 60 in all. This increase will enable them to promptly meet the growing demand for the Standard nail.

Bloomery Furnace, in Hampshire County, has been out of blast since January, but is in perfect order and will probably blow in again next April.

The LaBelle Glass Works, Wheeling, has lately suffered largely from the breakage of pots, and last week but three who's ones were left in the furnace. The fires were extinguished and the work of replacing the pots commenced. All thirteen will be renewed, and it will be two or three weeks before the works can resume operations.

The furnace of the Wheeling Iron and Nail Co. was lit up on Oct. 1, and the blast put on on the 3d.

## OHIO.

Messrs. Robbins & Myers, manufacturers of light gray iron castings, at Springfield, write us that in consequence of the pressure upon their present capacity of works, they have been compelled to put up an addition to their foundry, which consists of a brick building, 150 x 80 feet. This addition is now being completed, and will give them a foundry 300 x 140 feet, and a much greater facility for supplying the heavy orders which are constantly coming in. With the new addition they will be enabled to increase the number of their employees from 80, the number now employed, to 175. They melt, with their present capacity, 7 tons of iron per day, all of which is run into light castings. With their additional capacity they will probably consume 15 tons daily. They have not been able during the past 9 months to fill their orders, and have consequently had to refuse some orders. This company made a handsome display of light gray castings at the Cincinnati Exposition, which, for smoothness and strength, are probably unsurpassed by castings of their class.

The Champion Iron Fence Company, of Kenton, exhibited a number of their Ohio Champion double acting force pumps at the Cincinnati Exposition, together with their Champion iron fence. They made a very interesting display and attracted much attention.

The furnace of the Thomas Iron Company, at Niles, has been leased to the Girard Furnace Company, and will blow in soon. This stack was formerly called "Kitty" Furnace.

The Cleveland Rolling Mill Company are adding to their Siemens-Martin works, and will increase their product of this steel 150 tons per day.

A correspondent of the Cleveland Trade Review writes from Massillon: The Massillon Plate Glass Company have just about finished their new building, and expect to go into operation in a few days. They will employ from 60 to 100 hands, and intend to manufacture bottles and fruit jars. The members of the firm are C. W. Reed, David Reed and John Miller, Jr.

The new truck mill of the Mahoning Valley Iron Company, at Youngstown, is now on with six double puddling furnaces. Five more furnaces are in process of construction, and will soon be finished. This increases materially the output of the works.

ILLINOIS.

The McCormick Harvesting Machine Company, of Chicago, are erecting a brick addition to their main factory, 99 x 350 feet, four stories high, to be devoted to storage and light machinery; also an addition to their foundry, 90 x 90, and are building a new engine house, 20 x 35 feet, two stories, of brick. They have recently added a large amount of new machinery to their establishment, and to facilitate the more rapid handling of their commodities have rearranged the railroad tracks leading into the works. There are 8000 machines behind orders, and with the improvements mentioned they expect to increase their product to 40,000 machines next year. They will employ 1400 men.

W. H. Howell, foundryman and manufacturer of pumps, sad irons, fluting machines, &c., at Geneva, is working a force of 60 men. They turn out 4000 fluters a year and melt 5 tons of iron per day, and 40 tons of zinc every 12 months. The works cover an area of 225 x 200 feet. An extensive new finishing room has recently been added to the establishment.

The Gates & Scoville Iron Works, of Chicago, have given notice to the Secretary of State of an increase of capital stock to \$75,000.

Jas. Benson, machinist and founder of Centralia, proprietor of the Centralia Iron Works, reports that he is overrun with orders for Benson's Guarantee Steam Jet Pumps, and that he is obliged to work nights to keep up with his orders.

The Excelsior Iron Works are building five 40-horse-power boilers for Jesse Spaulding, of Chicago.

Owing to the scarcity of cars which has prevented the shipment of coke, some of our leading manufacturers have been obliged to shut down their furnaces.—Chicago Industrial World.

Stack No. 1 of the Joliet Steel Co. is now making about 100 gross tons per day. Superintendent Smith expects to put No. 2 in blast about December 1.

The United States Windmill and Engine Co., of Batavia, employ 160 men on full time. They manufacture about 1500 windmills a year, besides turning out a large number of railroad tanks for the various railroads. They are 30 days behind their orders. The works cover about 20 acres.

INDIANA.

The affairs of the Aurora Iron and Nail Co. are now being wound up.

KENTUCKY.

The A. C. & I. Railway Company Furnace has stopped to repair hot blast, &c.

Every department of the Norton Iron Works is in full blast and in fine working order and daily putting out the usual average of pig iron and nails. The company shipped last week, by rail and river, about 11,000 kegs of nails.

Pennsylvania Furnace has put in her new hearth, and is to resume blowing as soon as there is sufficient water.

Bellefonte Furnace is in splendid working condition, putting out an average of twelve tons of superior charcoal iron per day. She receives 18 loads of charcoal daily and about 1500 tons of iron ore per month. The furnace will end her present blast about the 25th of February, and will have made during the blast about 3200 tons of iron. She now has on hand some 20,000 tons.

MISSOURI.

A letter from South Pueblo, under date of September 17, says: "The first blast furnace in the State of Colorado, which was lighted here on the 7th instant, is turning out regularly and easily 54 tons of pig iron a day. The superintendent promises a run of 80 tons a day next week. All the coal and ore used are mined in this State, and the iron made is of the first quality. The officers of the Colorado Coal and Iron Company say they will turn out Bessemer steel rails in December, thus saving 1000 miles carriage on new rails for railroad extensions west of the Missouri River.—American I. & S. Bulletin.

MISSOURI.

The Duggan-Parker Hardware Mfg. Co., of St. Louis, have just completed and put into use a foundry as an annex to their establishment.

The Moran Bolt and Nut Mfg. Co., of St. Louis, have filed articles with the Secretary of State at Jefferson City. The capital stock is \$60,000, divided into shares of \$100 each, all of which are paid up.

The Mound City Stove Works, of St. Louis, is a recently incorporated association whose capital is \$4000.

The new Nova Scotia charcoal furnace, in Dent County, has been doing some good work since blowing in last July, on several occasions making over 60 tons No. 1 iron in the 24 hours. Her average for the time she has been running will probably reach 50 tons per day, and it is expected to go much higher.

MICHIGAN.

The Detroit File Works (Rowe & Hayes) have completed, and now occupy, their new works on Sullivan avenue, which are built upon an area of 90 feet front by 200 feet depth. The increased facilities for the manufacture of files is more than double their former capacity.

The following table from the Marquette Mining Journal, exhibits, in gross tons, the total lake-shipments of iron ore the present season, from the Lake Superior region, up to and including Sept. 28, together with the amount shipped during the corresponding period last year:

Where from. 1880. 1881.

Escanaba..... 911,593 1,085,035  
Marquette..... 530,614 553,779  
L'Anse..... 44,488 40,527

Total..... 1,486,695 1,679,341

An increase of 102,719 gross tons. In addition to this there was shipped pig iron, ore and quartz, as follows:

Pig Iron.

Carp River Iron Co.'s furnaces..... 5,709  
Pioneer Furnaces..... 6,158

Total pig iron..... 11,867

QUARTZ.

Carp River Iron Company..... 4,047  
Ore to local points..... 18,559

Total ore, pig iron and quartz..... 30,484



# The Iron Age

AND  
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New York, Thursday, October 13, 1881.

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**Thirty-ninth Page.**—Boston Hardware and Metal Prices.

Mr. Gladstone, in his recent speech at Leeds, dealt the fair traders a blow that they will find it difficult to parry. Referring to the Fair Trade League, he said that some persons complained about American tariffs. America sent us three millions' worth of manufactures, while we sent America from thirty to forty millions' worth. Fair traders wanted Americans to cease to be our customers to this amount. More unfair leaguers he never knew. Mr. Gladstone seems to be fully conscious of the absurdity of the positions so frequently

assumed, not only by fair traders, but by free traders. This absurdity often descends to downright impudence, and the funny part of it is that the authors of this impudence seem all unconscious of it. For example, a committee of the vessel owners of Glasgow and Liverpool called upon the English Government to induce it to make such representations to the French Government as would lead to the abandonment of the system of bounties on shipping mentioned in our last. The reasons urged by the memorialists why it should be abandoned were that it would build up the French carrying trade, and would be the means of greatly strengthening the French navy in time of war—in other words, because the system would be of great benefit to France, both in time of peace and war, France should abandon it. The impudence of the suggestion never seems to have dawned upon the memorialists. Similar suggestions have been made scores and scores of times in regard to our tariffs. We have been asked to abandon them in order that England could get more of our trade, and therefore that our mills and works should suffer to that extent. Our farmers have been urged to aid in removing our duties, in order that they might have the privilege of shipping their grain 4000 miles to market and abandon their markets at home. This is the drift of the English arguments for tariff, and the impudence of it, so manifest to others, does not seem to strike the average Englishman.

## The Iron Market and the Outlook.

Two years ago at this time the "boom" was well under way. Prices were advancing, to use the expression of Mr. Gladstone, "by leaps and bounds." Consumers, in their wild fear that the capacity of the iron mills and furnaces of the country would not be adequate to supply the prospective demand, were besieging manufacturers to book their orders for future delivery, and when producers refused, would offer prices far in advance of the market. Importers thought they saw an opportunity, and Atlantic cables were loaded with dispatches and Atlantic steamers with messengers, all after iron to supply the coming famine which these supposed wise interpreters of the signs saw just ahead. The result of all this is too well recorded in the memories and in the profit and loss account of our manufacturers, merchants and consumers to call for repetition. Iron went up, and then it came down. The famine did not prove so extensive as was predicted, and of the stock stored a good deal has remained stored or been "closed out at a bargain." At the present time there are many features of the market to recall that of two years ago. The consumption of iron is great; the demand for futures pressing; stocks are extremely low; but the bad features of two years ago are not repeated. Offers in advance of the selling price are not the temptation they were then. Futures may be booked, not at a fixed price, but at what the rate may be when the order is delivered. Foreign iron is not being bought in any great quantities; the chief purchases are of steel rails, blooms and similar stock, and this will not be long continued. In a word, the lesson of two years ago has been learned, considered and profited by. There are probably very few in the trade who do not believe that a steady market at ruling rates is better than a big rise and a hard fall.

It may not be amiss at this time to enter somewhat into the details of the condition and outlook. First, as to pig iron. Our quarterly returns of the blast furnaces are now well in, and so far as stocks are concerned, they show in most sections of the country a decided falling off—and this, too, in the face of the greatly decreased demand of the summer, arising from the stoppage of the mills from hot weather. Prices have advanced somewhat during the past three months, say from \$2 to \$2.50. Furnacemen claim that at these figures there is little or no profit, and in the case of many furnaces this is true; but many others which are well located and well equipped can make money at the ruling figures. There has probably never been such a consumptive demand for merchant iron in this country as at the present time. No doubt there have been times when the apparent demand was fully as great; but at these times it has been speculation in one form or another that has been behind the demand. Now there is an honest demand for consumption for all that our mills can make, and with the largely increased capacity of our mills it shows our assertion true. Stocks are extremely light. The hot weather of the summer has reduced the output of the country very largely, and left no opportunity for any accumulation either at mill or in warehouse. The card is fully maintained both East and West. There is no cutting or extras, but the full price is demanded. The Western Iron Association, at its recent meeting, was unanimous in its decision to keep the card where it was, and it may be taken as a fact that unless prices materially advance abroad there will be no advance here. Nails are even in a better condition than merchant iron. There have been times in the last month when it was well-nigh impossible to assort an order for 200 kegs in the prominent nail centers, 8d. and 10d. having been especially in demand. The reports of stocks show that for years there has not been such a light supply at this season of the year. A well-informed manufacturer gave

it as his opinion recently that ten kegs of nails were being driven at the present time to one driven last year.

Concerning the future it is always well to speak guardedly. It seems that the present condition of things is destined to last through the year at least. All sorts of foreign material is advancing. Ore that could have been bought at 11 cents a unit two months ago, is held at 12 to 12 1/2 cents now. Bessemer pig has advanced not only on this basis, but freights are high and scarce. Merchant iron is in the same condition, and it is more than likely that some heavy orders for certain grades of material that have in past years been placed abroad, will be divided among our mills. This is especially true of any material that will be affected by changes in the tariff. There is a belief that it will not be safe to risk bringing in iron under the Treasury decisions any longer. The McKinley bill may pass. The disturbing element in the future is the crops. If these are as bad as represented, our exports may fall off. This may not be an unmixed evil, however. Our drain on Europe might be too great.

## The Increased Consumption of Spelter.

Spelter has puzzled the metal trade a good deal for some time past, both in Europe and in this country. Everybody is fully aware that for various purposes the use of spelter has vastly increased during the past two years, yet the price has been steadily dropping, in spite of the most vigorous and powerful efforts to push it in the opposite direction and there maintain it. Early last year a syndicate of producers and their agents was formed in Silesia, Hamburg, on the Rhine and in England. At first the combination promised well, as it was formed at a time when wild speculation was generally successful; but when, in March, 1880, the speculative mania suddenly subsided, spelter declined with the other metals, without showing periods of buoyancy and recovery, as the others sometimes did. If the producers had reason to complain on that score, they had at least the satisfaction of observing that consumption was showing a steady increase, stimulated as it was by moderate prices. The impression began to prevail among close observers in the metal trade that consumption was likely to outrun production, and that in the near future spelter would rebound of its own strength, without the necessity of a syndicate to assist it in doing so. This opinion was freely expressed in Europe during the last quarter of 1880. When, later on, the activity of the zinc works in England became known from official data, these favorable impressions were weakened somewhat, for it was perceived that England had worked an enormous amount of foreign ores, and consequently drew less upon the Continental supply of slab metal. England's production of zinc ore last year was 27,548 tons, from which 7162 tons of metallic zinc were made. Besides this, 45,777 tons of ore were imported, Italy sending 11,028 tons, Greece 11,485, and Algeria 17,578, the balance all coming, we presume, from the North of Spain. The import of crude spelter was 33,301 tons, 13,480 tons coming from Germany, 7993 tons from Holland in transit, and 9402 from Belgium. Besides this, 16,677 tons of manufactures were received, Germany contributing 3797, Holland in transit 6678, and Belgium 5907. The export of spelter and manufactures was 12,237 tons, of which British India took 7640 tons. Estimating the yield of slab metal from foreign imported ore at the same figure as the domestic British, we find a production of 11,225 tons of metallic zinc, and, adding the output of spelter and its manufactures, we find the total obtained from abroad to have been 62,203 tons, of which 12,237 tons were re-exported.

The import of spelter into France, in millions of francs, has been as follows for the years named, the first column showing the whole year and the second the first seven months:

1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887

This shows great steadiness. The export of Calamine from Spain has been:

1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887

This movement also exhibits considerable steadiness. The Silesian output of metallic zinc has of late years increased at the rate of about 10 per cent. annually, say some 10,000 tons a year, which cannot be called a very rapid increase; but that portion of Prussia was in the habit of largely exporting sheet zinc to Russia, which export has been interfered with since the latter country raised the duty, chiefly for the protection of the Polish production, for Poland near the Prussian frontier has its own mines and is rearing a home industry. Poland now produces between 4000 and 6000 tons of spelter annually, but, under protection, this output may soon be doubled.

The consumption of spelter for galvanizing purposes has experienced quite a development both in Europe and this country. Advances from Rhenish Westphalia dwell upon this feature in the iron trade, especially so far as hollow-ware is concerned, and the same observation is made in the United States, in England and Austria. Brass making has been unusually active on both

sides of the Atlantic for more than eighteen months past, but consumption seems to be fully up to production in this line, and the amount of spelter absorbed at present in both hemispheres for the many uses it is turned to, we cannot help thinking must be something extraordinary. Reverting to the figures relating to production we have given, the impression is strengthened in our mind that it can hardly cope with the extensive use now made of the metal for a variety of purposes, and that spelter is in as sound a position as any of the other metals, if not more so, for it is, comparatively speaking, very cheap as it stands. The following table shows the range of prices here:

LOWEST AND HIGHEST PRICE OF DOMESTIC SPELTER AT NEW YORK, IN CENTS PER POUND.

1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887
1880	1881	1882	1883	1884	1885	1886	1887

October this year opened at about 5 1/2 cents. Throughout the first nine months of the year, as will be seen, spelter was very low, and fluctuated but little. It has been, so to speak, the black sheep of the metal trade, attracting in our opinion less attention than it should have done, for it was an open secret that our Western output has all along been laboring under difficulties. It is now revealed that the supply from there will not suffice for our growing wants in the immediate future, causing the metal to rise in value without any speculator having deigned to take notice of it. If, then, we are compelled to import once more on an extensive scale, holders in Europe, so easily influenced by any impulse from here, will take courage, and a syndicate on the other side may have greater chance of success than it had in January, 1880.

## Steam Heating and Cheap Gas.

Through some of the streets in the lower portion of the city of New York pipes are being laid for the purpose of steam distribution. Little noise is made about the matter, but the workmen go on quietly putting down the long sections of wrought-iron pipe, inclosing them in their covering of mineral wool and brick or wood, and then laying back the soil and replacing the pavements. Little can be learned directly beyond the statement that the company intend to supply steam for heating purposes at one or two pounds per square inch, and also steam for power at a pressure of 60 or 80 pounds—we do not know the exact figures. There are to be many boiler stations distributed along the city from the Battery to Central Park, and the whole machinery for the production and distribution is planned upon the most enormous scale. The engineer of the company, contrary to the general rule in such cases, has been selected with a keen eye to obtaining a competent man for the place, and a better man could hardly be found in the United States. While we admire the business ability and shrewd practical knowledge which has been shown in this scheme, and look forward to its more or less successful future, we are compelled to ask ourselves some important questions in regard to the project.

Upon a careful consideration of this method of distributing, we find ourselves face to face with the query, "Is this the best and most economical method of distributing heat and power, and will it probably have for any length of time a field free from dangerous competition?" Before an intelligent answer can be made to these suggestive questions, we must consider at some length conditions under which the company must of necessity work. It is an unfortunate fact that steam cannot practically be produced without a very material waste of fuel. Even under the most perfect conditions of boilers and furnaces, there are very considerable losses which cannot be avoided. It is true that by heating the air to be supplied to the furnace and by heating the feed water till the boiling point is nearly reached, a very high degree of economy may be attained. But these economies cost money, and when they are to be applied on a large scale, a great deal of money—so much, indeed, that the gain from their employment in this case is likely to be considerably reduced. It must, of course, be admitted that when producing steam in a large way and using the most approved form of boilers, it will be produced at a much less cost than is possible to the small steam user. In spite of this, however, there are large and serious losses. It will not be doubted for a moment that with the present condition of things the company has a field whose richness seems almost incalculable. The figures show that if they can furnish steam to every engine user, and to every steam-heating apparatus in New York City, at the smallest fraction of a cent above the cost per pound to produce it, they will have a very large income, while they can furnish the steam itself at a price far below what any individual can produce it for. Naturally business men, considering these figures, saw a "good thing" and hastened to realize it.

The horizon is not, in a scientific point of view, perfectly clear for the new enterprise, however. The cloud which indicates

trouble may be termed almost a chemical one, for it is the promise of a cheap "heating" gas, as it is called. Many new gas processes have been invented within a half dozen or dozen years, and though they have attracted little public attention, the thoughtful man who considers them from a scientific point of view, sees in them possibilities which will in the near future produce changes that we can hardly comprehend at the present time. The advantages of a gaseous fuel are very great. Of course, when gas is produced on a large scale, the greatest economy of production is possible. The improved processes of gas making reduce the cost of a thousand feet to a comparatively insignificant figure. Thus, it is possible to make a heating gas of the highest value and distribute it to the consumer for 18 cents per thousand feet. The statement has also been made, and upon what we consider the best of authority, that illuminating gas can be delivered to the consumer at 25 cents per thousand. This would, however, suppose a constant production and consumption both night and day. If the price is once reduced the demand will become so enormous that these figures will easily be maintained. At even 50 cents or \$1 per thousand gas is cheaper for cooking and heating than coal, and the consumption would at once become so large that the figures we have named would represent an enormous net profit. We may accept it as a fact to be realized in the near future, that gas at a very low figure, say \$1 or less, will be obtainable in this and all other large cities.

At the present time coal costs \$5 per ton, or 4 pounds for a cent. Gas varies from \$2.50 to \$2.25 per thousand cubic feet. At \$2.50, 4 cubic feet cost one cent, and at this figure we may easily compare a cubic foot with a pound of coal and establish a ratio between them. In small gas engines a horse-power has been produced with less than 25 cubic feet of gas per hour, or, say, 6 cents per hour. Steam engines developing the same power can hardly be supposed to burn less than 5 pounds of coal per hour for each horse-power, or 0.01 1/4 cent. This makes a heavy showing, and to many persons a conclusive one, since it shows that the gas costs 4.8 times as much as the coal. It does not, however, really show this, for the mere running expense makes no account of the coal and kindling used for starting the fire, nor of the coal left on the grate at the close of the day. No account is taken of the cost or annoyance of removing the ashes, nor the dust and dirt which they occasion. If the figures are reduced below 10 pounds per horse-power per hour, it would be, for a small engine, a surprisingly good result. This would make the two fuels stand as 2.4 to 1. In other words, for small engine users the gas engine will be as economical as steam when the price of gas falls to \$1.40 per thousand. It must be considered that the cost of the steam for the small engine is the steam heating project to be reduced to a minimum, and that there is to be no steam boiler to trouble the user of small powers. This is true, but we apprehend that the small steam engines will not use less than 30 pounds of steam per hour for each horse-power, and that the company will not be able to produce and deliver this quantity for less than three pounds of coal. When to this is added the profit and interest on a costly and rapidly deteriorating plant, we think the cost of steam per horse-power will be pretty high. Indeed, we cannot think that for engines of less than 10 indicated horse-power the charge will be less than 2 cents per hour for each horse-power. At that price the gas engine, at the present rates for gas, would be the most desirable engine, though costing nearly three times more than the other to run. There are many things in favor of gas engines which are likely to bring them more and more into favor, and as their manufacturers improve them and make them more economical, they are likely to prove still more formidable rivals to steam.

When we come to compare the value of steam and gas for heating purposes, the first cost is all in favor of gas. For steam heating not only must there be a pipe, but it is necessary to have radiators and return pipes, and certain complicated pieces of apparatus for measuring the steam and reducing its pressure. The latter we suppose will be furnished by the company, but the consumer will have to pay the interest and keep up the sinking and repair funds. The radiators cost a good deal of money and give more or less trouble. Against these difficulties we have to balance the advantages of gas. A cheap stove is all the apparatus needed. Wherever a gas pipe can be led the stove may be used. Where there is good ventilation, or where the heat is used for only a few minutes at a time, as in many sleeping rooms, the gas stove can be a portable affair, removable at any time, and the amount of fuel is a minimum. With the economy of such an apparatus steam can hold no comparison. Even with gas at \$2.50 per thousand, it is cheaper than steam made in the most economical of boilers. For the various culinary purposes gas is not only much more economical than steam, but the apparatus is very much cheaper, and has the additional advantage of being well known and in very extensive use already. Much skill and a large amount of inventive talent have been bestowed upon it. The question is naturally asked, Why has not it



gas question been taken up by the business men in the same perfect manner that the steam problem has been attacked? The answer is an easy one. The mine has been too rich. Those who have gone in have had their heads turned by the millions that lay ready at their hand. Naturally, when a man can stop in the midst of a great enterprise with a fortune ample for all his needs, he does not wish to push further. Gas at the present figures, made by the present methods, is immensely profitable, and is practically a monopoly, since each new comer can be "bought off" and coaxed to join the ring. The proof of this is easily found in the quotations of gas stocks. Out of a list of 44 stocks and bonds of gas companies, in a recent list of gas stocks, we find that 24 are quoted with bids at 100 or upward, some of the prices going higher than 200 with 100 par value. With profits which justify such bids for the stock, it is easy to see that any company successfully entering the field finds every inducement to drop all grand and extensive schemes for money making, and be content to take the very liberal percentages which it can earn in the good old way.

We expect to live to see the day when gas fit for heating purposes will be made at the mines and sent to tidewater or to the great seaboard cities in pipes. The saving in transportation will be very great, and the quantity used will be enormous. It is possible that the great coal carrying roads which reach New York, Philadelphia and Baltimore will undertake a work of this kind to supplement their coal trade. The scheme is so vast and promises to make such a revolution, not only in domestic, but in manufacturing economy, that we may well look with feelings of misgiving upon the elaboration of a scheme which, though great and beneficial, does not promise in any way to produce results that will compare with cheap heating gas when it can be had in our great cities.

#### Welland Canal Enlargement.

The Welland Canal was reopened to navigation on Sept. 20, and the commercial world has not been startled in the least by that event. The occurrence is scarcely honored with more than a newspaper paragraph, nor is the current of trade between the Northwest and the Atlantic Ocean visibly deflected. Montreal papers, despite their guarded language, betray something like disappointment. They remind readers that great changes have taken place in the routes of transportation since the plan for an enlarged Welland Canal was first conceived, and that in any event there may have been vague expectations which were not likely to be realized. "The difficulty," says the *Montreal Herald* "is this: That between Kingston and Montreal you not only have to canalize, in order to get over the old portages, and to remove bars, boulders, &c., from particular places, you have to excavate the bottom all along except where you find an accidental hole. There seems, then, to be every prospect that notwithstanding the vast expanse of inland waters and the thousands of miles of coast which will be made available, without breaking bulk, to very large vessels, Kingston must be the eastern limit of their voyages. That this is so from geographical causes is probably of less importance than it would have been had not mechanical reasons brought us to the same conclusions; but it seems doubtful whether, even if very large sailing ships—it may be different with steamers—could pass through the St. Lawrence canals, it would pay so to pass them." The conclusion thus reached, if correct, is a virtual acknowledgment of failure, a giving away of the whole question, for "Does it pay?" is the one vital point. Nevertheless our Canadian neighbors insist that the opening of the enlarged Welland is "an epoch of great importance," and that it ought to give them great advantages over "De Witt Clinton's wonder-working ditch." On the other hand, supposing that facts are perverse; supposing that while the Canadians have been digging their rival ditch, steel rails, narrow gauge, &c., have silently introduced new elements, thwarting all original calculations, what then? It may prove wholly impracticable to build vessels large enough for a continuous voyage from the lakes to the ocean, and to employ them with economy in the tedious navigation of canals and rivers. Our Canadian contemporaries confess to their apprehensions. Says the editor already quoted: "The most zealous friend to progress would probably not see without regret such a change as would render our vast waterways useless for the purposes of commerce. But the world does not stand still for the sake of sentimentalities, and it is in this direction, we confess, that we look with the most apprehension for a revolution which may eventually render useless our enormous investments in canals and other river improvements." The *Herald* may be too despondent by far. While the railroad war continues and while speculative prices forbid exports on any considerable scale, it is not the time to expect that either the success or failure of the Welland Canal shall be demonstrated.

A case has just been decided in the Rhode Island courts, involving the right of the employer to refuse payment of wages due a workman who leaves without notice. A workman had applied for a day "off,"

which was refused, whereupon he took it, regardless of the refusal. He was discharged the following morning, and was refused two weeks' wages which were due, on the ground that he had not worked his notice to quit. Suit was entered and judgment given in his favor. An appeal was taken by the employer company, and the decision was affirmed. In some parts of the country it is common for the workmen to make a contract, or quasi-contract, agreeing to give a certain notice, as in this case, two weeks before leaving, and to forfeit what wages might be due in case the "notice was not worked out." In every case that we have heard of when a trial has been had the employer has been beaten and the contract declared null and void, and it is right and just that it should be so. The contract makes the employer judge, jury, constable and collector, and no matter what the circumstances or provocation may be, the employer is the sole judge. It is simply an invitation to exercise a petty tyranny. But at the same time there should be a law compelling an employee to give notice if he desires to leave, and an employer to give a similar notice if he wishes to dispense with the services of an employee. The English rule is to require the customary notice, and if either party stops work without giving it damages can be collected, if in view of all the circumstances the jury sees fit to grant them.

It is interesting to note the change that has come over the views of British merchants on the subject of quotations of prices. The evidence of this change is found in the enlarged list of articles quoted in English newspapers and the great fullness of the quotations. Some journals, as the *Ironmonger* and *British Trade Journal*, have made quotations a specialty for years; but, in theory at least, these journals were not furnished to consumers, but exclusively to the trade, and it was only by some wicked subterfuge that a consumer saw their pages. Other journals also furnished reports from the prominent trade centers, giving the state of the market and some prices, but anything like the full trade reports and prices that are published in *The Iron Age* were not known. The practice, however, is tending to great fullness, and he that runs may read. The *Iron and Coal Trades Review*, which has always given quite full quotations, is extending. The *Colliery Guardian*, *Engineering* and other papers that cannot be called trade papers, publish quotations, and, on the whole, the tendency is toward the American practice in this respect—a practice, by the way, which originated in the columns of *The Iron Age*.

The following prices of coke in the different producing districts of England may interest those who manufacture or use Connellsville coke. The Durham coke, it may be well to say, is a better coke than the Connellsville. It is as hard and porous, and has less than half the ash. Of the other cokes we have no analysis. The quotations are for September 9, for blast furnace coke, and the price is at the ovens:

Durham district ..... 8/3 @ 9/3  
West Yorkshire district ..... 7/6 @ 8/0  
South Yorkshire district ..... 7/6 @ 8/0  
Connellsville coke is worth at ovens \$1.60, or say 6/3.

Iron shipbuilding is making good progress on the lakes, as well as on the Delaware.

The latest contract given out is for the building, at Buffalo, by the Union Dry Dock Company, of an iron propeller, 284 feet in length, and 2500 tons capacity, for the Union Steamboat Company. The keel sheets will be 12-16ths of an inch thick, and the garboard strokes 10-16ths of an inch, extending to the bilge. In strength and completeness many of the lake steamers would compare well with those in the Atlantic trade.

#### Hamilton E. Towle.

The news of the death abroad recently of Hamilton E. Towle recalls the bright career and remarkable achievements of a distinguished American civil engineer. Mr. Towle was a passenger on the famous Great Eastern during her memorable voyage across the Atlantic when she encountered a great storm, which broke her steering apparatus. Her commander and crew could do nothing in the terrible emergency, and she lay practically helpless at the mercy of the waves. In this critical moment Mr. Towle carefully, and with wonderful self-possession, examined the broken machinery and rigged up, from the material at hand, an apparatus of his own designing, which proved equal to the urgent needs of the situation. The improvised rudder brought the great vessel safely into port, and the distinguished American received from the grateful passengers, who deemed their lives to have been saved by him, the gift of a superb gold watch, ornamented with costly jewels, and engraved with a memorial inscription commemorating his historical feat of engineering. This time-piece he wore with conscious pride during his lifetime, and he also exhibited at times, with an equally pardonable egotism, a medal presented to him by an English humane society in recognition of his achievement. The steamship owners, of all who profited by his knowledge of engineering, however, were, it seems, the only ones to dispute the value of his splendid services, and he was compelled to bring suit to recover the salvage to which he was so justly entitled. At the time of the terrible shipwreck of the ill-fated Atlantic he delivered a lecture in Cooper Institute, asserting boldly, according to his knowledge of navigation, that the disaster was attrib-

table to faulty seamanship. From early boyhood he displayed a noteworthy inventive faculty, and rigged up all sorts of ingenious toy water wheels and the like. This profuse and surprising supply of clever ideas seemed to grow with his years, and the ingenious conceptions with which his active, mature brain teemed, and many of which bore fruit in useful engineering inventions seemed endless. He designed a surveying level which met a long-felt need; was instrumental in the perfection of the Towle bell register, adopted by the Third Avenue surface railway at the advent of the bell punch, and was interested in a host of other inventions, of which a machine for type setting, self-inking letter stamps, telegraphic instruments, argand burners, patent washing chemicals, theodolites and weighing scales, were but a few. Before his illness he was head of the Towle Manufacturing Company, in Cortlandt street, this city. The saddest feature of his death is that it is reported to have been due to the weakening of a brain whose strength and extensive creative power made him at times a marvel to his friends and associates.

#### The National Association of Charcoal Iron Workers.

CINCINNATI, October 8, 1881.

The second annual meeting of the United States Association of Charcoal Iron Workers convened at Cincinnati on Friday, October 7. At the initial meeting, which was held in College Hall in the afternoon, the number present did not realize expectations, but the subsequent meetings dispelled all doubt as to the lively and intelligent interest of the members of the association in its annual meetings, and the increased attendance and animated discussions made the assembly one long to be remembered.

His Honor, Mayor Means, welcomed the association to the hospitalities of the Queen City. He was followed in a happy address by Hon. Richard Smith, of the Cincinnati Gazette, who eulogized the usefulness of the charcoal iron industry.

Col. Wiestling, on behalf of the association, replied, expressing the thanks of the members for their cordial welcome to Cincinnati, and for the admirable arrangements for their comfort made by the Committee of Reception. He took occasion to correct the impression to which a remark of Mayor Means had given rise, that, owing to the rapid destruction of American forests, the days of the charcoal iron industry were numbered. Col. Wiestling adduced the statistics of the charcoal iron manufacture for 1880, which had been published in the *Journal*, to show that of the augmented output of iron for that year, the greater percentage of increase had been that of charcoal iron, and, in fact, that the increase of iron made with charcoal had been greater than that of other kinds of iron. President Wiestling then read his annual address, which was replete with suggestions for the advancement and improvement of the processes and appliances of this department of our country's industries, and expatiating on the advantages already derived from the publication of the *Journal* of the association.

After the appointment of a committee to revise the constitution and another to nominate officers for the ensuing year, the discussion of the president's address was taken up, and the matter of the best means of fighting forest fires and methods of preventing waste in the various processes of the manufacture of charcoal iron, were discussed. It was decided to dispense with the evening session of that day, so as to give the members an opportunity to inspect the Industrial Exposition in progress in the city. Adjournment was accordingly taken until the next morning.

At the meeting on Saturday morning a larger number were in attendance than the day before. The meeting was opened by the secretary reading letters of regret from prominent members of the association who were forced to be absent, and letters from various parts of the world giving data concerning the number of charcoal iron works and the amount of charcoal iron produced in different countries; also a letter from the Oswego Iron Company, of Oregon, giving a description of their works, which was received with great interest, and which opened a lively and instructive discussion, participated in by delegates from fourteen different States. This discussion was mainly upon the yield of charcoal per cord of wood, the yield of wood per acre, the best methods of charring and the results obtained. Valuable data were given by managers of iron works throughout the country concerning the quantity of charcoal they had been able to obtain from a cord of various kinds of wood by water or kiln coaling, and also the comparative results obtained from different sized and different shaped kilns. The best time for cutting and coaling wood was also considered, as well as the best means of clearing the ground from the accumulation of brush wood and debris. Among those who participated in this discussion were a number whose names have become household words from the success which has attended their efforts as producers of charcoal iron.

An informal discussion then ensued, in which the general opinion expressed was in favor of making the annual meetings of the association more for work than for pleasure; and while the excursions to various iron works, as a means of instruction, were approved, it seemed to be the unanimous wish of the members that subscription dinners and unnecessary rounds of amusements should be discouraged, as not in conformity with the objects of an organization of business men and for business purposes. The session lasted four hours, and while without the transcription of the stenographer's notes a full idea of the scope and subject matter of the discussion cannot be given, all the members present expressed themselves highly gratified with the information gained concerning the methods used and results obtained by other iron workers in widely separated parts of the country.

This was the last session to be held in Cincinnati during the annual meeting, the others being programmed for Ironton during the excursion to the iron works in that vicinity, and a vote of thanks was tendered to the

mayor and citizens of Cincinnati and to the reception committee for the ample and abundant arrangements for the comfort and enjoyment of the members of the association, the invitations to the places of entertainment and instruction with which the city abounds being, in fact, more numerous than the limited time of the association permitted it to accept.

Before adjournment, the following resolution was also adopted:

"Resolved, That this association expresses its disappointment in not having a report at this meeting from the committee on weights and measures, and that said committee be instructed to furnish a report at the next annual meeting of the association, and that the secretary be instructed to forward a copy of this resolution to the members of the committee."

In the evening, upon invitation of the reception committee, the association enjoyed a pleasant banquet at the Highland House, where an opportunity of viewing the city by night was given. Hon. L. E. Warner, of Cincinnati, presided. After disposing of the viands prepared, the following informal toasts were offered and responded to: "Our Guests," responded to by Gen. Millard Warner, of Alabama; "The Queen City," Hon. Ben. Butterworth, M. C. from one of the Cincinnati districts; "The United States Association of Charcoal Iron Makers," Col. Geo. B. Wiestling, president; "The Local Reception Committee," Mr. Thos. G. Smith; "The Ladies," Mr. Frank King, of Virginia; "Our Craft," Mr. W. H. Lee, of Missouri; "The Great State of Ohio," Hon. Gilbert Atherton, M. C., of Ohio. There was a noticeable absence of the humor that generally pervades post-prandial remarks. The speeches, however, were all able, and expressive of the good will which now exists between all sections of the country, and declarations favorable to a protective tariff were prominent. A noteworthy incident of the evening was a declaration by Hon. Gilbert Atherton that, although differing radically in politics from the honorable gentleman who preceded him (Hon. Ben. Butterworth, a fellow M. C. from Ohio), when it came to the question of protecting the industrial interests of Ohio and of the nation, he and his constituents would be found fully as zealous in their behalf as Mr. Butterworth.

A laudable feature of the annual meeting was the quiet observance of the Sabbath by the association. No arrangements were made by the Executive Committee for any entertainments or visits on that day.

At 7.30 Monday morning a train consisting of five coaches started from the Plum street Depot, by the Marietta and Cincinnati Railroad, for the excursion to Ironton, and to visit the furnaces en route and in that vicinity. Universal regret was expressed that the president of the association was called home and could not accompany the excursionists on the trip. The first stop made was at the Richland Furnace, which is making about 16 tons of foundry iron per day from local ores. Owing to the necessity of meeting the arrangements of the railway, the stay there was not so long as was desired in order to get full and complete data. Ample provisions for the "inner man" had been made by the proprietors, which the brief time allowed for the stop did not permit the party to do justice to. Immediately upon leaving Richland Furnace a bountiful lunch was spread on the train by the Committee on Reception. At the junction of the Marietta and Cincinnati main line and its Portsmouth branch, down which lay the route of the excursion, it was joined by a delegation of manufacturers from the Hanging Rock region.

#### Iowa Farmers and the Barb Fence Wire Patents.

WORCESTER, MASS., Oct. 10, 1881.

To the Editor of *The Iron Age*.—Under the name of the "Farmers' Protective Association," certain parties have been for some months seeking to prejudice the community against us and against the patents upon barb fencing in which we are interested, by published statements calculated to give a distorted view of the whole subject. The letter of C. C. Cole, in your issue of 23d ult., is of that character, and contains misstatements so glaring as to demand specific denial.

1. We are not to be compared or classed with those owners of patent "drive wells," "gates" or other articles, by whom the "farmers" have been persecuted, for we have sued infringing manufacturers only, refusing in all cases to bring suits against the farmer or consumer.

2. With reference to the validity of our patents, it is enough for our present purpose to say that after one of the most exhaustive legal investigations ever bestowed upon a patent subject, our patents have not only been decided to be good and valid with reference to the very points referred to by Judge Cole, and that by the highest court known in the administration of patent law next to the Supreme Court of the United States, but the question of the validity of our issued patents, after having been brought before the same court, by special petition and careful review a second time, a second time were declared to be properly renewed, and to be good and valid.

3. No fair-minded person would find the suspicion of bad faith suggested in said letter in the fact of our having licensed the principal parties whom we had sued for infringement, if it be borne in mind that those against whom we had brought suits were already in the business, and had, in most cases, their entire capital invested in that business; that the pressure for the material was great, with an immediate demand for all that could be produced. What other course could we have pursued, unless we had been willing to sacrifice the good and convenience of the public, or unless we had some spirit of vindictiveness in which to indulge? It would seem also plain that if any collusive arrangement had been desired or contemplated, it would have been consummated before the decision of the court rather than after.

4. It is claimed that we and our licensees are making too great a profit on barb fencing. How much foundation exists for this will appear in the following computation:

Present price of wire suitable for barb fencing in Chicago, 4 1/4 cents; freight to Central Iowa, 1/4 cent; cost for manufacturing, 1 cent; royalties, 3/4 cent; amounting to 6 1/4 cents per pound. The regular price to the purchaser in 50-ton lots is 7 1/4 cents, which leaves one cent a pound as the total profit that the manufacturer can make, under any circumstances, where barb fencing is ordered as above. And out of this is to come the expenses of storage, of insurance, of handling, the percentage of bad debts, and all the other expenses and risks incident to the handling of a bulky material of prime necessity, which must be carried in stock in considerable quantities.

It is true that the regular price for smaller lots is higher, but this discrimination in price between him who buys hundreds of tons and the party who buys but a single spool or in small lots, is one which is observed in the sale of every class of goods, and the difference made in this respect with reference to barb fencing, is not as great as that which obtains generally in other lines of goods.

In whatever price is obtained of any consumer or small buyer over and above 7 1/4 cents, is to be found the remuneration of the jobber and the retailer. Mark, then, the unfairness of our being held up before the community as receiving 10 and 11 cents for barb fencing, when our customers and the customers of our licensees are almost exclusively the large buyers above referred to. This should effectually dispose of what Judge Cole refers to as "the grievance of the farmers," and leaves the one cent per pound as above, standing out in strong contrast to the 3 cents per pound so conspicuously displayed by Judge Cole.

We now come to a still more extraordinary statement in this letter, that "Mr. Washburn stated to a committee of farmers in Des Moines, Iowa, a few weeks since that there were sold in Iowa during the last year over 150,000 tons of barbed wire." In the first place, Mr. Washburn hereby utterly disclaims having made any such statement, and can produce ample evidence of the truthfulness of this disclaimer. Again, 150,000 tons is more barbed wire by 30,000 tons than has ever been sold in the whole United States, commencing with the 5 tons estimated to have been sold in 1874, and ending with the 50,000 tons which is an outside estimate of what will be sold in 1881. The total estimated sales in all the United States during the calendar year of 1880 were 40,250 tons, and one-twelfth of this amount would, perhaps, be a large fraction to give Iowa, or say 3000 to 4000 tons. But 4000 tons of barb fencing, at 75 cents per 100 pounds, is \$60,000. The truth, then, is that possibly on the last year's business, which was much the largest ever done with Iowa in barb fencing, the total amount of royalty fees on all the barb fencing sold in that State would amount to \$60,000.

Compare for one moment 4000 tons and \$60,000 with 150,000 tons and \$2,250,000 as testified to by Judge Cole, and this after mature deliberation, assisted by those who, like himself, are striving to enlighten the farmers of the Northwest with reference to their interests, involving the sacred rights of property and the long established principles of trade.

In this connection compare 1 cent per pound upon 4000 tons of barb fencing, or \$80,000, the utmost that could have been made last year in profits on barb fencing, in Iowa, with the 3 cents per pound and the \$9,000,000, additional, which Judge Cole deliberately displays in your columns, and which has been copied profusely throughout the Northwest, and then say what becomes of his character as a reliable adviser, as a sagacious and conservative leader of a great people. Yet such statements are the only grounds upon which he unhesitatingly parades in the same letter, against us, charges of "grievance," of "extortion" and of "outrage!"

5. Judge Cole's statement that the farmers have been paying in years past the royalty of 75 cents when they have purchased (barbed) wire at the price of 6 and 7 cents is so extraordinary that we give it entire.

Mark you, the farmers have been paying in the years past the royalty when they have purchased the wire at the price of from 6 to 7 cents, for they purchased either directly from the Washburn & Moen Manufacturing Co., or from other companies who were liable to pay (and hence, in fixing their price, took the same into account) the 1/4 cents per pound royalty to them. The farmers of Iowa, in years past have, therefore, not complained at paying into the pockets of the patentees the \$1,250,000 per annum; but when, by their combination, they create a monopoly and demand the additional sum of \$9,000,000 a year from the farmers of Iowa, then it is that the farmers say they must have protection against such monopoly, extortion and outrage.

This is a remarkable assertion, in view of Judge Cole's supposed familiarity with the extent and character of the litigation we have been conducting in years past for the purpose of obliging manufacturers of barb fencing to recognize the validity of our patents, and especially as he must know that only two of our present thirty-nine licensees, have paid us any royalty until within the past few months.

6. With reference to Judge Cole's statement regarding cost of plain wire and cost of manufacturing into barb fence wire, we, with due deliberation, put our statement above against his, and the farmers must judge which is likely to be right.

The Northwest have been large customers of ours as long as wire of any kind has been required by them for fences or for any other purpose. We think they will believe our statements, and disbelieve that we are a party to any plan, in whole or in detail, such as is suggested in Judge Cole's letter.

7. In view of the foregoing, we are entirely willing to submit our statements to the farmers of the Northwest, in blank contradiction of every important statement made by Judge Cole in the letter we are referring to.

WASHBURN & MOEN MFG. CO.

The Paris correspondent of the *Manchester Guardian* says: It has not been possible to establish an agreement on cottons, cutlery, leather or woolen yarns in the negotiations for the commercial treaty. There have been only differences of detail in regard to the first three articles, but with respect to the last it was found impossible to classify goods so as to prevent the unfair operation of specific duties.



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The most popular Horse Shoe in the world. Will outwear three Iron Shoes.

Dunning Steel Finished Horse Shoes may be ordered in any quantity, packed, assorted sizes to suit, from the following hardware houses:

SIMMONS HARDWARE CO., St. Louis.

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PARKHURST & WILKINSON, Chicago.

W. B. BELKNAP & CO., Louisville.

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Are forged from a solid bar of steel. Afford a firm level bearing, thereby securing to the horse the most natural position for comfort and speed. Is a self-cleaning shoe, and will not "ball up." Equally good for summer or winter use. Will prevent horses from "calking" or growing corns. Can be resharpened as readily as an iron shoe.

## OPINIONS.

I do not hesitate to give it as my opinion that it combines more excellences than any I have before seen. It provides a solid base under all circumstances, for the horse while standing or traveling; has no rocking motion while the animal is turning, and possesses eleven calks to protect him from falling. I have never seen the inventor of this improvement, but I desire, in the interest of the noblest animal living, to thus thank him for the good his shoe is likely to bring him.

HENRY BERGH,  
President the American Society for Prevention of Cruelty to Animals, New York.

Office of North Chicago City R. R. Co.,

Chicago, Feb. 16, 1881.

CHICAGO STEEL HORSE SHOE CO.—Gents: We are using your "Dunning Steel Horse Shoe" on our car horses, and find they last us from three to four months before being worn out. We drive our horses about 16 miles a day—half over cobble stones and balance pavement. We consider them the best shoe made.

M. W. SQUIRES, Supt.

No. 55 to 58 W. VAN BUREN ST.,

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CHICAGO STEEL HORSE SHOE CO.—Gents: I have used the Dunning Steel Shoe on my horses with great satisfaction. I regard it as the most practical and valuable improvement yet made in Horse Shoes. I am sure they will commend themselves to owners and shoers. Yours truly,

A. W. KINGSLAND,

Secretary Northwestern Horse Nail Co.

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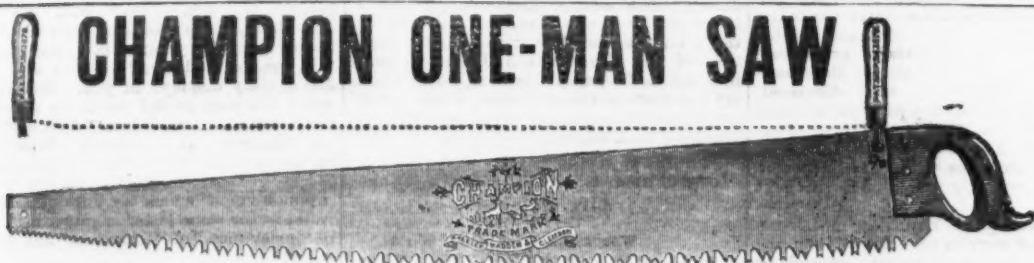
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WITH PATENT ADJUSTABLE ATTACHMENT. The only Saw that can be adjusted for either a One-Man or a Two-Man Saw. We make the following lengths, 3½, 4, 4½, 5 feet. Send for sample.

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BROOKLYN, E. D., N. Y.,

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**HAND, PANEL, AND RIP SAWS,**  
AND KINDRED GOODS;

Also, MILL, CROSS-CUT AND CIRCULAR SAWS.

**BAND SAWS A SPECIALTY.**



## MAD MULLER.

Mad Muller, on a summer's day  
Raked the meadows sweet with hay.  
Beneath his straw hat glowed a glare  
That filled with brimstone the morning air.  
Swearing he worked, till his oaths so free  
Frightened the birds from bush and tree.  
His breath gave out and he took a rest,  
But a longing for vengeance filled his breast.  
A wish that his tongue was free to own  
That something better than he had known  
Would keep his hogs at bay and morn,  
From rooting the seed from his fields of corn.  
A neighbor drove slowly down that way  
And stopped, just to pass the time of day.  
He drew his reins in the oak tree shade,  
And, looking around him, slowly said—



"What makes you stand such rooting and things,  
When to stop if you only need HILL'S HOG RINGS?"  
Heamed from his lately blazing eyes.  
He bought the rings and he tried them on.  
And a victory over those hogs he won.  
No longer as mad a fiend was he,  
As he walked abroad his corn to see,  
For each big hog, with a ring in his snout,  
Was slowly and harmlessly grunting about.  
And the corn it sprouted and bravely grew,  
And made a big crop, as corn should do.  
And as he looks at his fields, he then  
Softly whispers "It might have been  
That I in the fall would have no corn to show  
Had HILL'S HOG RINGS (Triangular) not helped  
me so."  
And to all of his neighbors the praise he sings,  
Of the man who invented those blessed HOG RINGS.



**10,000,000**

OF HILL'S TRIANGULAR HOG RINGS have been sold in nine years, consuming 550,000 pounds of wire, measuring 3400 miles.

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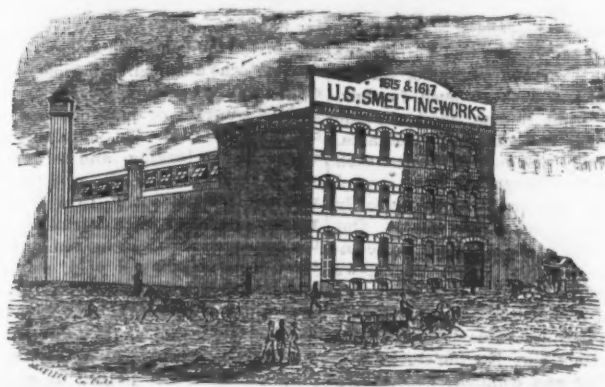
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SOLE MANUFACTURERS OF



TRADE MARK.



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Chain and Rope Goods.

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WEST TROY, N. Y.



NEW DESIGN.

# 'Miller's 6-Lever'

Cast Brass Padlocks, with or without Tinned Iron Chain or Nickel Plating.

Awarded "First Order of Merit" at the International Exhibition at Melbourne, 1881.

Keys will not pass unless so made to order. The most secure, most durable and cheapest Padlock extant. Master-Keyed Padlocks to order in sets of any number required.

New price lists ready.

**D. K. Miller Lock Company**

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SILVER STEEL DIAMOND X CUT SAW

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SPECIALTIES: Fluting Machines, Hand Cutters, Plating Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers and Cake Mixing Machines.



## Artistic Sheet Metal Work.

Ever since sheet-metal cornices have been in vogue in this country there has existed a demand for odd ornaments, vases, pieces of statuary, finials, roof trimmings, &c., which in their material should be light and durable. Accordingly articles of this kind have been "hand-hammered," as it is called. Sheet zinc and copper have been the materials employed for the purpose, but while some creditable specimens have been produced, the majority of the work executed has been anything but artistic. With reference to this point many of our readers can testify. Sheet-metal effigies of "Justice" surmount the towers of many court houses in the West. "Chicago pattern" has become a by-word, being used as a term of derision and reproach. The effigy of Shakespeare, from its lofty perch on the front of the Linsville Opera House, looks down upon a deriding world, and unless the elements do their work in an unusually short time, it, too, will be a by-word after the mechanics concerned in its production have gone to their long homes; and so we might go on multiplying instances—citing statues of Agriculture, Commerce, Industry, The Arts, Manufactures, Liberty, America, to the end of the list—which are scattered over the country, perched in ambitious places, all going to prove the lack of artistic perception and mechanical ability of the men who built them. But such is not the purpose of this article. We have called attention to the wretched work now commonly produced in this country, in order, by contrast, to better

also manufactured cotton stuffs, are being superseded to a large extent by the exporters of the United States, who send their goods to this market with a much better finish and at prices more advantageous to importers.

## SCIENTIFIC AND TECHNICAL.

Mr. Julius Schmidt, of Schwelm, Westphalia, has recently proposed the

## COLD ROLLING OF WIRE AND FINE IRON

by means of small rollers with semi-hexagonal grooves, forming a hexagonal section. The application of the hexagonal rollers has the advantage, he says, that the wire or fine iron is always under a central pressure, the structure of the metal will not alter, and the formation of seams is avoided. Each pair of rollers is carried in little bearings fixed on a standard. All standards rest on a foundation plate, which at the same time carries the main standards, on which the plunger blocks for the driving shafts are fixed. The latter serve for the motion of the rollers. The train of wheels is so arranged as to obtain such speed and direction of motion that the wire will pass through the rollers first one way and then the other, or alternately forward and backward.

The subject of wind pressures on engineering structures having lately attracted much attention, a simple formula for finding

## THE PRESSURE OF WIND UPON A FIXED PLANE SURFACE

will be of value. Let  $v$  = velocity of current in feet per

second;  $h$  = height through which a body must fall to produce the velocity;  $w$  = weight in pounds of a cubic foot of the impinging fluid (being for air about .0765 pounds). The pressure ( $p$ ) of a fluid striking a plane perpendicularly, and then escaping in a direction at right angles to its original path is that due to twice the value of  $\frac{h}{2}$ , and we therefore have, since  $h = \frac{v^2}{2g}$ ,  $p = \frac{w v^2}{g}$ , which equation becomes, if we substitute for  $w$  its value .0765 pounds,

$$p = \frac{.0765 v^2}{32}$$

The value  $p = \left(\frac{v^2}{20}\right)$  is, however, close enough for practical purposes, and by its aid the following table of pressures is obtained:

Velocities in		Pressure in pounds per square foot.
Feet per second.	Miles per hour.	
10	6.8	0.25
20	13.6	1.00
30	20.4	2.25
40	27.2	4.00
50	34.0	6.25
60	40.8	9.00
70	47.6	12.25
80	54.4	16.00
90	61.2	20.25
100	68.0	25.00
110	74.8	30.25
120	81.6	36.00
130	88.4	42.25
140	95.2	49.00
150	102.0	56.25

These are maximum pressures only, and in case pressures exerted on surfaces placed obliquely to the current should be required, the following formula must be resorted to:

$$p = \left(\frac{v \sin B}{20}\right)^2$$

$v$  being the velocity with which the current strikes the plane, and  $B$  being the angle of obliquity. In regard to the assumption of maximum wind pressures, it may be observed that in England 40 pounds per square foot are, as a rule, adopted, this value being somewhat lower than what is generally accepted in the United States. These values must not be supposed to be strictly correct, since many of the instruments used to determine them are little better than useless; or if this is not the case, they are often so injudiciously placed, as to record the effects of combined, and, therefore, locally accelerated currents.

A correspondent, writing from Milan, describes as follows

A STRANGE EXPERIENCE WITH STEEL RAILS: "Some time since I observed some steel rails covered with rust, lying in a corner of the court of the Polytechnic School. Their

abnormal appearance excited my curiosity so much that I determined to make a sketch of them and to find out the cause of their deformity. They were placed in the tunnel of Pitechio, on the line from Bologna to Pistoja. The mishaps were caused as follows: On the night of December 9, 1878, the ordinary train left Pitechio at 2:24. It was composed of 15 wagons, and the gross weight was 142 tons. After leaving Pitechio the train only traversed 1660 meters, with a grade of 0.023 meter, and on a curve and counter curve of 300 meters radius; 1450 meters of this lay in the tunnel. But the train had scarcely entered the tunnel when the locomotive could make headway only with difficulty, owing to a coating of ice on the rails, and the force of adhesion between the wheels and the rails became so small that at 307 meters from the northern opening of the tunnel the machine, although continuing to work, failed to make any headway. The conductor of the train, who was in the luggage compartment, could not at first make out the cause of the stoppage, but on taking up a lantern and looking at the walls of the tunnel he found that the train was at a standstill. After vainly signaling to the engineer he went forward to the locomotive, where he found both the engineer and fireman lying unconscious from the effects of the accumulated steam. A heavy storm of wind and snow was blowing. Another train had passed over the same rails, but from the contrary direction, and had rendered their surface as slippery as ice. This surface was owing, of course, to the steam and smoke which condensed in the

by figures etched on the iron, these being deepest where the action is strongest, the depth of the marks being nearly proportional to the intensity of chemical action. Experiments in regard to this subject have, however, up to the present time, been confined mainly to the deposition of copper on magnetized iron. Prof. Remsen made a series of experiments which, however, led to no satisfactory result until he adopted the following manner of proceeding: He placed a shallow vessel of thin iron, containing a solution of copper sulphate, on the poles of a permanent magnet. In the lapse of a short time the outlines of the poles could be distinctly seen through the solution. Pouring off the latter, the following result was observed: The plate of iron was uniformly covered with a film of copper, with the exception of the outlines of the poles, which were sharply defined as depressions, showing that less action had taken place there. Between the poles, which were of rectangular shape, lines appeared, running parallel with the sides of the poles and perpendicular to the lines of force. These lines were evidently produced by irregular deposits of copper. It was now questionable whether poles similarly shaped and differently placed would similar results would be obtained, and three additional trials were made. In each case it was observed that the direction of the ridges resulting from irregular disposition of the copper were at right angles to the lines of force. There can be no doubt that the effects observed are to be ascribed to the action of magnetism, either on the

been found by analysis that india ink contains such animal glue, and, consequently, if a small quantity of bichromate of potash be used with it, the lines drawn with such prepared ink will not be affected by water, providing that they have been exposed to the sunlight for about one hour.

The *Revue Polytechnique* has recently described a new method of

## DECORATING IRON AND STEEL BY COPPER PRECIPITATES.

the method being as follows: 35 parts of copper sulphate, or any other copper salt, are dissolved and treated with an alkaline base, which precipitates an oxyhydrate. To this precipitate is added a solution of 150 parts of Rochelle salt, and finally 1000 parts of water are introduced. When this solution has clarified, about 60 parts of caustic soda are added. The article to be coated with copper is first immersed in an alkaline bath and thoroughly cleansed with a stiff brush, after which it is immersed in the copper solution. Great care must be exercised in this operation to prevent a too rapid deposition of the copper. When the solution loses its strength, an additional quantity of hydrate of copper should be added, the amount of which must not, in any case, exceed the figure given above. By properly regulating the deposit of the copper, highly artistic effects may be produced and different shades of colors obtained, such as red, green, blue, violet, &c. Such parts as are required without any copper deposit, are simply covered with a layer of paraffine or varnish, which is readily removed after having taken the body from the copper bath.

Mr. W. F. King, of Edinburgh, has recently invented and tested in practice an ingenious method of

## STEERING VESSELS BY ELECTRICITY.

the results obtained being quite favorable. The apparatus was tried on a steamer plying between London and Glasgow. It supplies the place of a helmsman, causing the compass to regulate the course of the ship. For this purpose the compass card is provided with an index, pointing in the direction which the vessel is to take. About one degree from the index are placed contact pieces, one to the right and the other to the left of it, each being connected with an electrical element. As soon as the course of the vessel deviates from the indicated direction, the index comes in connection with one of the contact pieces, thus closing an electrical circuit, the current putting in operation a hydraulic apparatus, which regulates the rudder. Should this invention give satisfactory results in rough weather, there is some probability of its adoption by many sea-going vessels.

Since the process of making malleable nickel has been perfected, many articles made of this material, and especially

## NICKEL TABLE UTENSILS.

are coming into extended use. They are manufactured in large quantities in Prussia, and are much preferred to similar articles of other materials. The hardness of the metal renders it capable of acquiring a high polish, which is not readily injured by friction; grease or dirt does not adhere to it firmly on account of the smoothness of its surface, and the cleaning requires very little exertion. It does not tarnish when used frequently, and has, moreover, the advantage of possessing about one-half its original value when worn out.

M. J. B. Hannay and Robert Anderson have a paper in the proceedings of the Royal Society of Edinburgh for December, 1879, on the

## EXPANSION OF CAST IRON WHILE SOLIDIFYING.

in which they arrive at the conclusion (having made trials in different ways) that "liquid cast iron expands at least 5.62 per cent. of its volume on freezing."

A French gentleman of some experience recommends the following process for producing

## A LAGGING FOR STEAM PIPES.

which, besides being comparatively inexpensive, appears to be very effective: A long tube of some flexible material, such as canvas, is drawn over a metallic pipe of approximately the same diameter. Either of the ends of the canvas tube is bent over, so as to reach into the interior of the metal pipe, and is pulled through it, while at the same time quantities of cloth fibers are introduced, so as to completely fill it. After one length of the canvas tubing has been partly disposed of in this manner, another length may be drawn over the metal pipe, as before, one of its ends being connected with the piece almost drawn through. Having done this, the additional length may be drawn through, this process being carried on until a sufficient length of lagging has been obtained. Its cross section is round, as a matter of course, and may be altered by subjecting the lagging to the process of rolling.

In the case of the coal mine of Oistro, the quantity of coal was computed to be sufficient for eight years' working, and it was consequently of some importance to adopt a cheap and safe method of keeping open the levels and inclined planes for that period. Three methods were considered, namely, timbering, walling, and iron framing, and it was finally agreed upon that the

## USE OF IRON FRAMING FOR LEVELS

would be superior to the other methods. The timbering, as was found by previous experience, required renewal at least four times in two and a half years, thus causing great expense, combined with delay at each renewal. The estimated cost of brick walling was also considerably greater than the cost of iron framing, the former being £5.5/3 per meter (including the accumulated interest), while the latter was only £4.5 per meter, without deducting the value of the old iron. The frames are of the ordinary rectangular post and lintel construction; the former 7½ feet, and the latter 6 feet long, and are made of H iron, 5 inches high, 2½ inches breadth of flange, and 0.27 inch thickness of web, weighing 32½ pounds per yard. This, although less advantageous as regards strength than an elliptical section of gallery, was preferred, as requiring a simpler and less expensively fitted ironwork. The two uprights are fixed in a floor or sill piece of oak, 8 inches square; and the cap,

iron plate or on the liquid, or on both. Experiment can decide between these possibilities. If the effect is due solely to magnetization of the iron, then non-magnetic metals will not exhibit similar phenomena; while, if it is due solely to the action of the magnet on the liquid, the same or similar effects should be obtainable with non-magnetic metals. A very important question is thus left open, with which Prof. Remsen proposes to occupy himself shortly, and the solution of which will undoubtedly prove of great interest.

A process has been patented by which a galvanic deposit is produced on a casting of easily fusible metal, which latter may be removed by the action of acids, thus producing

## GALVANOPLASTIC HOLLOW FIGURES

of an exceedingly thin material. The models of the required figures are of zinc, cast in carefully constructed, separable brass molds, of which the single pieces are soldered together, when required for use, by an easily fusible solder of 3 parts of lead, 1 of zinc, 3 of cadmium and 9 of bismuth. The casting is thoroughly cleansed, and is then covered with a deposit of copper, silver or other metal, as may be desired. Should the deposit required be one of silver, the model must first be coated with a thin film of copper, and to insure the uniformity of the deposit, anodes of silver, following the outlines of the casting, are suspended in the cyanide bath, equidistant from the opposite sides of the former. As soon as the deposit is of the required thickness, the body is removed from the bath, thoroughly washed, and subjected to the action of acids which dissolve the zinc matrix. The process of solution is greatly accelerated by the presence of a copper wire in the zinc, thus producing a powerful galvanic action. The hollow silver figure may afterward be boiled in a solution of cream-of-tartar, by which process a bright whitish color is produced. Should a copper figure be required, the zinc model, as well as the copper deposit must be coated with silver, in order to guard against any galvanic action when removing the matrix by acids. Another method of producing such hollow figures consists in casting the model itself of the above mentioned easily fusible solder, and afterward removing it by the action of steam or hot water, the fused mass escaping through holes left specially for this purpose.

The blurring of india ink in working drawings of machinery has been the source of much trouble and annoyance, and can be easily remedied by making use of the following

## PROCESS TO FIX INDIA INK ON PAPER.

first mentioned in the *W. V. D. Ingenieur*. It is a fact well known to photographers that animal glue, when treated with bichromate of potash and exposed to the sunlight for some time, is insoluble in water. It has



ARTISTIC SHEET METAL WORK.—GRIFFINS AND TRIPOD, ON THE NEW HIGH SCHOOL BUILDING, STUTTGART, GERMANY.

show some really fine work which has been done on the other side of the water, engravings of which constitute our front page illustration this week. We believe sheet-metal workers generally will be interested in the following description:

The central portion of the new high school at Stuttgart, Germany, has been ornamented in a somewhat novel manner, by erecting on stone pedestals the tripod and griffins shown in the accompanying engravings, and which, according to mythology, are supposed to be symbols of wisdom and vigilance. They were designed by architect Sauter, modeled by Prof. Plock, and manufactured by Messrs. Eichbenger and Leuthi, of Stuttgart. The griffins, as well as the tripod, were chased by hand and by means of dies and a drop. They are made of strong sheet copper, and are finished in an excellent manner.

The tripod is 2.3 meters (7.57 feet) high, and consists of a disk 1.26 meters (3.24 feet) in diameter, which is carried by a central column and three legs ornamented with lions' paws. The three feet are connected by a ring, strong, though it looks light. In order to render the tripod sufficiently strong, it is provided with a wrought-iron skeleton, which consists of a foundation plate, to which are attached a tube passing through the central column, and stays for the three legs. There is a framework within the disk, which is connected with the skeleton bracing of the central column and the legs.

The two griffins have a height of 2 meters (6.58 feet) but as the wings of these animals present a very large surface to the action of the wind, it became necessary to strengthen them by a system of wrought-iron bracing. The weight of the tripod, including bracing, is 780 kilograms (1716 pounds), and that of each of the griffins 800 kilograms (1760 pounds). The statues still show the brightness of new work, and it depends upon the action of the atmosphere whether they will be coated by a good "patina," the formation of which, however, can be aided by well-known means.

The engravings, which are faithful representations of the work, show the artistic excellence possible in ornaments of this kind. In its execution, it will be noticed that a combination of dies in a drop, with hand tools, was employed. We suggest that herein is a point for American mechanics. Good work of this kind is not impossible in this country, and we hope to live to see the time when the reproach now attaching to sheet metal statuary will be removed—when the reputation of our factories will be vindicated by the production of some really first-class pieces.

American manufacturers are gaining ground in Central America. The consul at San José, in his yearly report just published, writes: I should here mention that English manufactures of cutlery and hardware, as



ESTABLISHED 1841.  
ROCHESTER, N. Y.

# THE FORSYTH SCALE CO.,

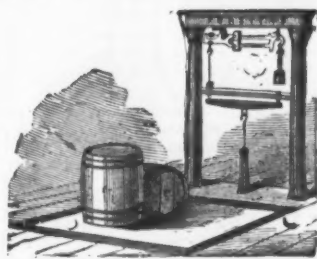
Youngstown, O.,

FORSYTH CO. Consolidated and  
Removed in 1881 to Youngs-  
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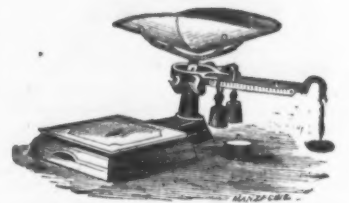
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### LIGHTNING HAY KNIVES.

WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow  
and stack, cutting fine feed from bale, cutting corn stalks for feed, cut-  
ting peat and ditching marshes.  
The blade is best cast steel, spring temper, easily sharpened, and is  
giving universal satisfaction. A few moments' trial will show its merits,  
and parties once using it are unwilling to do without it. Its sales are  
fast increasing for exports as well as home trade, and it seems destined  
to take the place of all other Hay Knives.  
They are nicely packed in boxes, one dozen each of 30 pounds weight,  
suitable for shipping by land or water to any part of the world.

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**HIRAM HOLT & CO.,**

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For sale by the Hardware Trade generally.

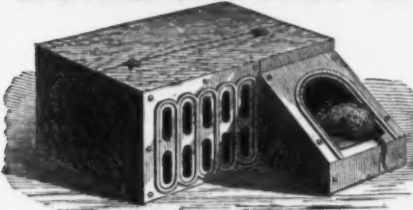


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### Delusion Rat and Mouse Trap,



Manufactured by  
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ERIE, Penna.  
This is the only Self-setting Trap on the market,  
and the most successful.  
All orders direct to  
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NEW BEDFORD, MASS., Sole Manufacturers of

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Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,  
**BIT STOCK DRILLS,**

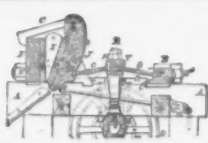
DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL  
PRESSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER  
AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS.  
DRILL GRINDING MACHINES. TAPER REAMERS, MILLING  
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All Tools exact to Whitworth Standard Gauges.

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New Haven Conn.



**BLAKE'S  
Challenge Rock Breakers.**  
Patented Nov. 18, 1870.  
See The Iron Age first issue of the  
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### Lubricator Cups

For oiling valves and cylinders of  
steam engines by the only perfect  
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Through the Steam Pipe  
The oil passes in sight, drop by  
drop, into the column of steam  
where it vaporizes, thus becoming  
a steam lubricant, oiling perfectly  
every part reached by the steam.  
Any clean oil, black or white,  
light or heavy, may be used. Saves  
from 50 to 90 per cent. in oil and  
wear of machinery, thus paying  
for itself several times a year.  
A cup will be sent to responsible  
parties on twenty days' trial, if desired. In ordering  
give diameter of cylinder.  
NOTICE—The first Lubricators ever made, showing  
the oil passing drop by drop through a transparent  
water chamber, were devised by us, and the same are  
fully embraced by many Letters Patent owned and  
controlled by us. Lubricators of every nature em-  
bodying the above feature, made by other parties,  
are encroachments upon our rights, and we will hold  
purchasers and users, as well as manufacturers, re-  
sponsible in damages for such violations.

Office, 98 Griswold St., Detroit, Mich.  
First Prizes at Fair American Institute and Millers'  
International Exposition, Cincinnati, 1880.  
NOTE—In our recent suit against the American Lu-  
bricator Co., of Detroit, before Justice Stanley Ma-  
thews, of the U. S. Supreme Court, involving their  
sight-feed feature, a decree was rendered in our favor  
August 20, 1881.

### DETROIT LUBRICATOR MFG. CO.,

Office, 98 Griswold St., Detroit, Mich.  
First Prizes at Fair American Institute and Millers'  
International Exposition, Cincinnati, 1880.  
NOTE—In our recent suit against the American Lu-  
bricator Co., of Detroit, before Justice Stanley Ma-  
thews, of the U. S. Supreme Court, involving their  
sight-feed feature, a decree was rendered in our favor  
August 20, 1881.

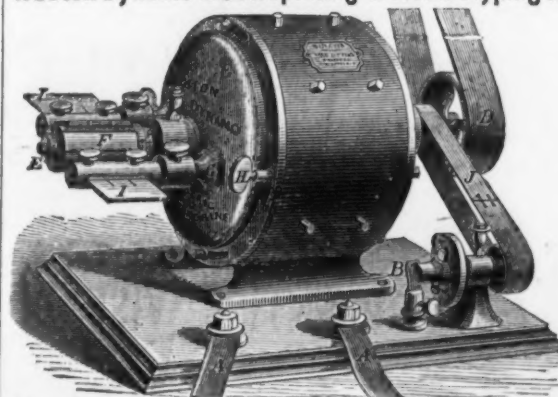
**DAVID ROUND**  
HAND MADE COIL  
CABLE & BLOCK  
CHAINS.  
CLEVELAND, O.  
SEND FOR PRICES

### BLACKSMITHS' FORGES

(Patterson's Patent),  
Portable or stationary, superior to stone or brick.  
Can be used with bellows or fan. Send for infor-  
mation to the

**FORGE COMPANY,**  
Brooklyn, E. D., N. Y.

### HANSON & VAN WINKLE, Sole Agents for Weston Dynamo Electroplating & Electrotyping Machines, Newark, N. J.



For Nickel, Bronze, Brass, Copper  
and Silver Plating.  
Over 1000 machines in use.  
Are used by all leading stove  
manufacturers.  
Experienced men sent to put  
up machines and instruct pur-  
chasers.

INFRINGEMENTS.  
We call attention to infringe-  
ments of the Weston Machine  
in which Automatic Switches  
are used to prevent change of  
current. The Weston Co. are  
owners by grant or purchase  
of all forms of Automatic  
Switches for Plating Machines.  
The adoption of these ma-  
chines will certainly lead to  
great loss to parties purchasing  
or using them.

MANUFACTURERS OF  
Cast Nickel Anodes, Pure  
Nickel Salts, Polishing  
Materials.

Manufactory, Newark, N. J.

New York Office, 92 & 94 Liberty St.

### Stanley Rule & Level Co.,

MANUFACTURERS OF

**Improved  
Carpenters'  
Tools.**



FACTORIES  
New Britain, Conn.

WAREHOUSES,  
29 Chambers St.,  
New York.

Manufacturers of Bailey's Patent Adjustable Planes,  
General Agents for the sale of Leonard Bailey & Co.'s "Victor Planes,"  
Manufacturers of "Defiance" Patent Adjustable Planes.

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OUTSELLS  
ALL  
OTHERS.  
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Close  
Prices  
TO  
Jobbers.



Double  
The Size  
OF  
Common  
Poppers.  
—  
Retails  
FOR  
25 Cents.

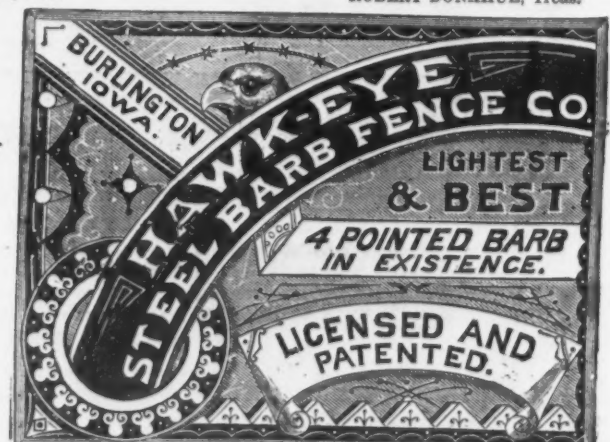
Wood Patent, April 14, 1874.

Made of Plated Wire, Durable and Handsome.

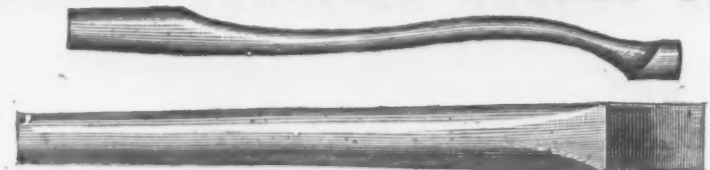
**BROMWELL MANUFACTURING CO., Sole Makers, Cincinnati.**  
Agents: **W. H. QUINN & CO.,** 79 Chambers Street, New York.

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ROBERT DONAHUE, Treas.



**HUNDLEY & HANKS,**  
PROPRIETORS OF  
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MANUFACTURERS OF

**Handles and Spokes,**

19 Hoade Street and 97 Chambers Street,  
HARDWARE COMMISSION MERCHANTS, NEW YORK.



**WILEY & RUSSELL MFG. CO., Greenfield, Mass.****LIGHTNING SCREW CUTTING MACHINERY AND TOOLS.**

Bolt Cutters in great variety. Screw Plates for the use of Machinists, Carriage Makers and Blacksmiths. Taps and Dies, Drilling Machines, Tire Benders, Horse Shoers' Vises, &c., &c.



SPECIAL SCREW PLATES FOR THE USE OF MODEL MAKERS, CARRIAGE MAKERS, ETC.  
Send for Illustrated Price List.

**J. STEVENS & CO.,**

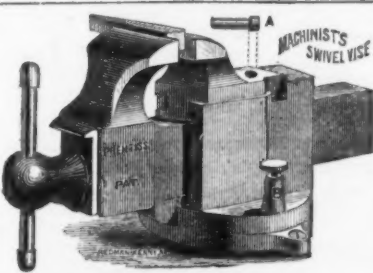
Chicopee Falls, Mass., P. O. Box 224,  
Manufacturers of

**SPRING CALIPERS AND DIVIDERS**

Also, Surface Gauges and Counter Sinks, Stevens' Patent Breech-Loading Sporting Rifles, double and single barrel; Shot Guns, Pocket Rifles, Pocket Pistols, and the noted Hunters' Pet Rifles. Our

**SHOOTING GALLERY RIFLE**

Is the favorite everywhere.

**PRENTISS' PAT. VISES,**

Adjustable Jaw.  
Stationary and Pat. Swivel Bottoms.  
Adapted to all kinds of Vise Work.  
Sold by the Trade.

**PRENTISS VISE CO.,**

23 Dey Street, New York,  
Sole Proprietors.  
Send for circular

**A. J. DAVIS & CO.,****Patent Friction Hoisting Engines**

For Mines, Quarries, Dock Building, &c.

MANUFACTURERS OF

SHAPERS, DRAIN PIPE MACHINES, BAG AND SACHEL MACHINERY,  
Steam Engines, Wire Drawing Machinery, &c., &c.

69 N. J. R. Avenue, Newark, N. J.  
Correspondence solicited.

**THE FRENTRESS STEEL BARB WIRE.**

Patented Dec. 14, 1875.

Reissued May 2, 1877.

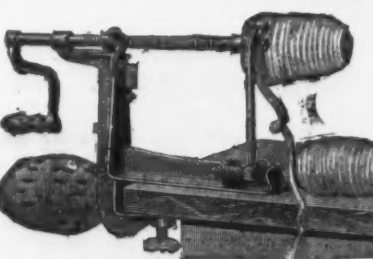


The most popular Barb Fence Wire now offered in market, at prices which cannot be undersold. Send for Price Lists and Circulars.

MANUFACTURED BY THE  
**ST. LOUIS WIRE FENCE CO.,** | The Frentress Barb Wire Fence Co.,  
814 & 816 N. Second St., St. Louis, Mo. | East Dubuque, Illinois.

**GOODSELL'S WHITE MOUNTAIN POTATO PARER.**

Patent Applied For.



The White Mountain Potato Parer is the only machine ever made that will not only pare a potato much better than it can be done by hand, taking off a thinner paring from every shape or kind of potato, but will go into and clean out the eyes, and altogether at a saving of at least 30 per cent. It is free from the objections made to the old style of rattletrap, geared parers; is solid and substantial, cannot get out of order, and so cheap as to be within the means of everybody. Almost any of the Potato Parers in the market seem as if they might do the work better "next time," but the "White Mountain" DOES IT NOW. Every Machine warranted as represented.

Price to the Trade, \$5 per dozen.

GOODSELL CO., Antrim, N. H., Sole Manuf'rs.

**TURNED MACHINE SCREWS,**

One-sixteenth to five-eighths diameter.

IRON, STEEL and BRASS.

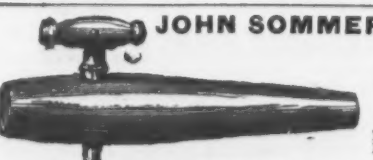
**JOHN FELLOWS,**

(Successor to LYON & FELLOWS.) Factory and Office, 14 Durham Place, Williamsburgh, N. Y.

**Bradley's Cushioned Helve Hammer**

Awarded first premium, Silver Medal, at American Institute Fair 1873; Cincinnati Industrial Exposition, 1874 and 1880, and the Diploma of Honor and Grand Medal of Merit at the Centennial Exhibition in 1876, being the highest award given any goods of their class in America or Europe. It has more good points, does more and better work, takes less power, costs less for repairs, than any Hammer in the world. Guaranteed as represented. Established 1832.

**BRADLEY & COMPANY, Syracuse, N. Y.**

**JOHN SOMMER'S SON, 8, 10 & 12 Pearl St., Newark, N. J.**

Manufacturer of every description

**WOODEN FAUCETS.**

Cork Lined, first quality, warranted. Metallic Key, Lignumvitae Key, Rosewood, Red Cedar, Cherry and Butternut Faucets.  
John Sommer's Metallic Key and First Quality Cork-Lined Faucets are the best. Send for catalogue.

**PATENTED ARTICLES****MALLEABLE IRON.****Hammer's Adjustable Clamps.**

Hammer's Malleable Iron Oilers, 3 Sizes.  
Hammer's Mail, Iron Hand Lamps.  
Hammer's M. I. Hanging Lamps.  
Pattern Heavy Screw Clamps; strongest in the market.  
For sale by all the principal Hardware dealers.  
Send for Price List.

**Malleable Iron Castings**

Of superior quality and Hardware Specialties in Malleable Iron made to order.

**HAMMER & CO.,**

BRANFORD, CONN.

**THE GIANT PAD LOCK.**

Manufactured by

**THE SMITH & EGGE MFG. CO.**

(Centennial Award.)

**"Superior in Every Respect."**

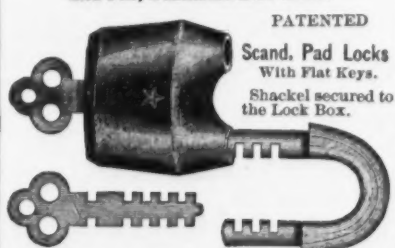
This is one of the best selling Locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made—of the best material—very hard—some in appearance, and every Lock is warranted. Orders solicited. Address as above.

Lock Box 1705, Bridgeport, Conn.

**STAR LOCK WORKS.**

ESTABLISHED 1836.

Trunk Locks, Door Springs,  
Pad Locks, Trunk Stays,  
Dead Latches, Keys, &c., &c.  
110 South 8th St., and Sanson, bet. 8th and 9th, PHILADELPHIA.

**HILLEBRAND & WOLF.****GEORGE N. PIERCE,**

BUFFALO, N. Y.,  
Manufacturer of

**BIRD CAGES****AND REFRIGERATORS.**

Send for Illustrated Catalogue.  
Prices quoted upon application to BUTLER & DIEL, Agents at Syracuse, N. Y.; OPEN STOVE VENTILATING CO., 78 Beekman St., New York; or GEO. N. PIERCE, sole manufacturer, Buffalo, N. Y.

WHOLESALE AGENTS.

L. SCHILLINGER, Syracuse, N. Y.  
FRATT & CO., Buffalo, N. Y.  
FRATT & CO., Elmira, N. Y.  
RATHBONE, BARD & CO., Detroit, Mich.  
H. W. LENTZMEYER, Cleveland, Ohio.

**Metal Workers' Crayons.**

More convenient and cheaper than either common or French chalk. For manufacturers of all sheet metals, metal workers, machinists, blacksmiths, &c. Send for sample and price list.

**D. M. STEWARD,**

Sole Manufacturer,

331 State Avenue, Cincinnati, Ohio.

to which two angle irons, 2.3 inches in the side, are riveted at the distance of 6 feet apart, is placed across their upper ends. The thrust of the walls forces the uprights against the projecting angle-irons, and binds the pieces together without any special fastening. Every second frame has the cap piece strutted by a A strut made of an old mine rail, whose ends are supported on angle-iron brackets riveted to the uprights, 25 1/2 inches from the top.

At first the frames were placed 30 inches apart, but the pressure was so great that the distance has been diminished to 20 inches, and the system of diagonal strutting has been adopted for the floor as well as the roof. The walls of the level are lined with short lengths of stout plank, which are sawn up by a steam saw mill at the mine. A complete frame weighs 233 pounds, the average cost is about 38¢; and, supposing the average distance apart to be 24 inches, the cost per lineal meter (3.25 feet) will be, with eight years' interest, £4. 6/, as given above. From this, however, must be deducted the value as old iron, at least 10¢ per frame, or 16/8 per meter, which, deducted from the preceding amount, gives £3. 9/4 as the net total cost per meter, or only about two-thirds that of brick walling. The iron is protected by a coating of Ihne's zinc gray, which seems to answer its purpose exceedingly well. Of about 170 meters of level and shaft, 46 meters have been lined with iron, the advantage of its use being especially apparent in the latter case, where more than one-fourth of the labor ordinarily expended has been saved.

Prof. Mohr, of Dresden, considers it remarkable that

**THE INFLUENCE OF WOEHLE'S EXPERIMENTS**

ON THE DESIGN OF STRUCTURES IN IRON, should have been manifested by an outcry for a modified system of design and for fresh regulations on the construction of works in iron. He holds Woehler's so called "law" to be, in its numerical application at least, of doubtful accuracy. If, indeed, this law be accepted as a basis of an empirical formula, a variety of factors would have to be introduced in addition, of which the following are only the principal: 1. The magnitude, form, and composition of the cross section. 2. The strength of the joints. 3. The duration of the load. 4. Shocks due to a moving load. 5. It must be recognized that the safety of a compound structure, such as a girder, is not directly proportional to the strength of the separate members. 6. Inaccuracy in computing the stresses, which in some members can be calculated with great accuracy, in others not within an error of from 30 to 50 per cent, or even more, would have to be guarded against. Taking the average of formulae proposed by Gerber, Launhardt, Mueller, Weyrauch and others, the following mean values for permissible stresses in railway bridges are obtainable:  $n$  being in each case the ratio of the numerically least to the greatest of the alternating stresses to which any piece is subject;  $n = -1$  when the stresses vary between tension and compression of equal magnitude, and  $n = 0$  when each oscillation begins with zero stress, and  $+1$  when the stress is invariable:

$n = -1$	$n = -0.75$	$n = -0.5$
350	424	487
$n = -0.25$	$n = 0$	$n = +0.25$
563	663	780
$n = +0.5$	$n = +0.75$	$n = +1$
940	1077	1268

The value for  $n = +1$  is here extraordinarily high, and for  $n = -1$  is extraordinarily low. Prof. Mohr then proceeds to show that the adoption of these mean values involves the application of a nearly constant factor of safety of 3.2 or 3.3 to Woehler's results, and argues that to justify it the proof is necessary: 1. That the sum of the errors which may occur in the assumed data are in constant ratio to the sectional area to be provided. 2. That the danger involved in a transgression of Woehler's figures has a constant value for all values of  $n$ ; and, 3. That the amount of error and the magnitude of the danger are correctly estimated in the above factor of safety; no one of which suppositions can be true. He concludes with a practical suggestion in designing bridge-work; namely, to sort the various members into classes and allow different maximum limits of stress in these classes. Those pieces in regard to which no uncertainty exists, may safely be subjected to higher stress limits than those less favorably situated, either as regards possibility of accurate calculation or mode of application of the load.

Mr. Thomas Ellis, of Coatbridge, near Glasgow, proposes

**A NEW METHOD OF CONNECTING METALLIC WIRES,**

the manner of proceeding being as follows: A piece of iron, similar in shape to an olive, is pierced at the ends to admit the insertion of the wires, two larger holes being situated near the middle, through which a pair of pinners may be passed to bend back the extremities of the wires in such a way as to form a sort of ring. This fastening is, moreover, easily undone when required. Instead of bending the wire, a small nut may be applied to its extremity, or what is better still, the olive-shaped iron may be tapped in order to fasten the wire. The mode of connection is especially convenient for telegraph wires.

The belief current among many millers on the chalk streams of England that they could foretell the advent of rainfall from a sensible increase of the volume of water in the streams, led Mr. Baldwin Latham, a well known authority on water supply, to make a series of very interesting experiments on

**THE EFFECT OF BAROMETRIC PRESSURE ON THE DISCHARGE OF SPRINGS,**

the results of which experiments he has submitted to the scientific world in a paper read before the British Association at York. Gauges were set up on the Bourne flow in the Caterham valley, near Croydon, and he found that, whenever there was a rapid fall in the barometer, there was a corresponding increase in the volume of water, and that with a rise of the barometer the

quantity of water decreased. The increase of flow he attributed to the expansion and escape of the gases held by the water under low barometric pressure, which caused the water to escape more freely.

Samuel Denison & Son have just made, at their works, a very

**POWERFUL WEIGHING APPARATUS,** capable of weighing up to 70 tons. It is what is known as one of their patent suspended weighing machines, and is destined for use on the crane at a large Glasgow shipbuilding yard, to weigh boilers and other heavy machinery while lifting them into vessels. The size of the body of the machine is only 45 by 30 1/4 inches, and it is so sensitive that 4 pounds placed upon the lifting hook will actuate the indicating steel-yard. Such results have probably never been attained before by any other suspended machine.

Electricity is now employed in the

**RECTIFICATION OF INFERIOR ALCOHOL,**

by passing a current, generated by a voltaic battery and a dynamo-electric machine, through it. By this operation the superfluous hydrogen is disengaged, and beet-root alcohol, which is usually very poor, can be made to yield 80 per cent. of spirits, equal to that obtained from the best malt.

Messrs. F. & I. Butterfield & Co., Midland Tool Works, Keighly, England, have just completed

**A MONSTER CRANE**

of 50 tons, manufactured for Mr. John Dickenson, of Sunderland. This crane is stated to be the only one of its kind in England. The frame is made of wrought iron riveted together, and is mounted on four iron carriages, each having four runners 3 feet in diameter. The jib is 71 feet long, and on the top is fixed a staging on which a man can stand. The crane is geared for three lifts, namely, 12, 25 and 50 tons respectively, and the lever and hand-wheel for working it are all placed on the staging under the jib within easy reach of the attendant. The boiler and engine, with the weight and balance boxes, are placed at the other end. The crane is driven by a pair of self-contained engines, 10 1/2 feet cylinder, 14 feet stroke, steam being supplied by one of Cochran's patent vertical boilers, 5 feet 3 inches diameter and 12 feet high, with a heating surface of 26 feet square. The total cost, including the fixing of the crane, is estimated to be about £30,000.

Instead of the old method of shrinking wheels to their places on shafts or securing them by driving and keying, the

**APPLICATION OF HYDRAULIC PRESSURE TO FORCE WHEELS ON SHAFTS**

is now employed to a considerable extent. The question arises as to what, if any, taper should be given to the bores and axle seats, which question was discussed at the meeting of the master car builders (England). It was stated by some that a slight taper should be given to the shaft, the wheels not remaining tight without it, while others professed that if the bores and shafts were parallel, with a proper allowance for fending, no trouble would be experienced. Concerning the amount of this allowance, it was determined by experiment that, for a standard car axle, the diameter of the wheel seat should be 0.004 larger than the wheel bore, and that these would require a pressure of about 32 tons to force the wheel home. These may be assumed as average conditions, but the smoothness of boring and turning would undoubtedly have some effect in making this variable. Thus, on wheels having a bore of 4 1/2 inches diameter and 5 inches long, the axle being of steel, Mr. T. W. Peeples (master mechanic of the Manhattan Elevated Railroad, New York) rule is to reject wheels requiring less than 26 tons or more than about 35 tons to force them on. These wheels form excellent examples, on account of the excessive duty to which they are subjected by reason of the frequency of stoppage under the pressure of the vacuum brake. These wheels are bored parallel with a feed of 1/4 inch per lathe revolution, the axle seats being made with a taper just discernible by calipers. This taper is necessary in order that the inner part of the boss, though somewhat abraded or compressed by forcing the axle, may be as tight as the front part.

Mr. Harris Tabor, superintendent of the Hartford Engineering Company, has introduced an ingenious way of fixing

**A STEEL PIN IN A CAST IRON CROSS-HEAD,** by taking a steel tube, turning it up true, and setting it in the sand before the cross-head is cast. The gate runs through this tube, and in filling the mold "burns" the steel tube fast on the cast-iron core. This method has the advantage of having the pin turned and finished before casting the cross-head, so that, beyond a little cleaning up, no work need be done on it.

The Cleveland Safe Works of Mr. George Price, Wolverhampton, England, completed a short time ago

**AN IMMENSE SAFE,** being 7 feet 6 inches in length, 6 feet in height and 5 feet in width. It is bound on all sides by heavy steel plates, secured and strengthened by strong angle, T and channel iron. The whole is constructed both with regard to utility and the greatest degree of solidity, and presents the most resistance to the crushing, lateral and other strains that in its peculiar application it is liable to be subjected to. The safe is to be dispatched at the close of the present month to the Philippine Islands.

The cotton seed oil mills that are rapidly being put in operation in the South, are creating no little stir and discussion as to their effect upon the agricultural interests of the country. This is a comparatively new industry, and we already find that no less than 120,000 tons of oil cake, or cotton seed meal, has but recently been shipped abroad, not counting the supply sold and consumed in non-cotton producing sections of our own country.

The foreign exports of Columbia River from January 1 to September 9 were valued at \$4,059,367, and were made up chiefly of wheat, flour and salmon.











## EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the two weeks ending Oct. 11, 1881:

Hamburg.	Santander.
Val.	Val.
Idw. pgs. 15 3143	Idw. pgs. 15 3143
Lea. bds. 28 216	Lea. bds. 28 216
L. r. goods, cs. 3 217	L. r. goods, cs. 3 217
Ptms. gals. 320,861 30,048	Ptms. gals. 320,861 30,048
Spelter, slabs, 320 12,097	Spelter, slabs, 320 12,097
Sew. ma. cs. 842 17,540	Sew. ma. cs. 842 17,540
Ir. pipe, pcs. 280 1,800	Ir. pipe, pcs. 280 1,800
Arms, cs. 1 105	Arms, cs. 1 105
Clocks, bxs. 84 1,500	Clocks, bxs. 84 1,500
Mach'y, cs. 1 400	Mach'y, cs. 1 400
Ptms. gals. 3,054,816 164,614	Ptms. gals. 3,054,816 164,614
Idw. cs. 13 277	Idw. cs. 13 277
Mf. iron, pgs. 50 1,150	Mf. iron, pgs. 50 1,150
Antwerp.	Alente.
Val.	Val.
Mf. iron, pgs. 30 390	Mf. iron, pgs. 30 390
Ptms. gals. 366,016 21,281	Ptms. gals. 366,016 21,281
Idw. cs. 16 104	Idw. cs. 16 104
Elisnore.	Constantinople.
Val.	Val.
Ptms. gals. 118,071 10,998	Ptms. gals. 118,071 10,998
Rotterdam.	Mexico.
Val.	Val.
Idw. cs. 6 143	Idw. cs. 6 143
Mf. iron, pgs. 11 375	Mf. iron, pgs. 11 375
Pumps, pgs. 1 160	Pumps, pgs. 1 160
Mach'y, cs. 1 160	Mach'y, cs. 1 160
Dutch West Indies.	Dutch East Indies.
Val.	Val.
Ptms. gals. 1,033 272	Ptms. gals. 1,033 272
Dutch East Indies.	Dutch East Indies.
Val.	Val.
Ptms. gals. 220,000 25,988	Ptms. gals. 220,000 25,988
Dede Agatch.	London.
Val.	Val.
Ptms. gals. 140,000 15,017	Ptms. gals. 140,000 15,017
London.	Central America.
Val.	Val.
Mf. wire, cs. 14 243	Mf. wire, cs. 14 243
Clocks, bxs. 318 7,473	Clocks, bxs. 318 7,473
Idw. cs. 77 4,090	Idw. cs. 77 4,090
Ptms. gals. 1,033 272	Ptms. gals. 1,033 272
Ag. imp. pgs. 9 280	Ag. imp. pgs. 9 280
Car. cs. 1 678	Car. cs. 1 678
Pumps, pgs. 1 105	Pumps, pgs. 1 105
Sew. ma. cs. 1 105	Sew. ma. cs. 1 105
Mf. iron, pgs. 50 975	Mf. iron, pgs. 50 975
Norwegian.	Castlari.
Val.	Val.
Mach'y, cs. 1 574	Mach'y, cs. 1 574
Liverpool.	Trieste.
Val.	Val.
Copper, cs. 90 18,090	Copper, cs. 90 18,090
Metals, cs. 3 369	Metals, cs. 3 369
Sew. ma. cs. 37 714	Sew. ma. cs. 37 714
Idw. cs. 13 2,404	Idw. cs. 13 2,404
Mach'y, cs. 13 2,404	Mach'y, cs. 13 2,404
Clocks, bxs. 277 8,030	Clocks, bxs. 277 8,030
Pumps, pgs. 3 200	Pumps, pgs. 3 200
Ag. imp. pgs. 7 280	Ag. imp. pgs. 7 280
Pumps, pgs. 12 225	Pumps, pgs. 12 225
Hull.	Canary Islands.
Val.	Val.
Ptms. gals. 181,050 18,500	Ptms. gals. 181,050 18,500
Ag. imp. pgs. 9 280	Ag. imp. pgs. 9 280
Pumps, pgs. 3 200	Pumps, pgs. 3 200
Clocks, bxs. 277 8,030	Clocks, bxs. 277 8,030
Mf. iron, pgs. 50 975	Mf. iron, pgs. 50 975
Idw. cs. 57 999	Idw. cs. 57 999
Great Yarmouth.	Hayti.
Val.	Val.
Ptms. gals. 100,000 8,000	Ptms. gals. 100,000 8,000
Belfast.	Venezuela.
Val.	Val.
Ptms. gals. 306,750 24,700	Ptms. gals. 306,750 24,700
Limerick.	Brasili.
Val.	Val.
Ptms. gals. 150,750 11,768	Ptms. gals. 150,750 11,768
Leith.	Brasili.
Val.	Val.
Mf. iron, pgs. 30 390	Mf. iron, pgs. 30 390
Bristol.	Brasili.
Val.	Val.
Nails, bxs. 3 123	Nails, bxs. 3 123
Ag. imp. pgs. 9 280	Ag. imp. pgs. 9 280
Mach'y, cs. 1 160	Mach'y, cs. 1 160
Leather, bales 48 6,000	Leather, bales 48 6,000
Cardiff.	Brasili.
Val.	Val.
Ore, case. 1 60	Ore, case. 1 60
Glasgow.	Brasili.
Val.	Val.
Mach'y, cs. 1 160	Mach'y, cs. 1 160
Jap. iron, pgs. 3 123	Jap. iron, pgs. 3 123
Mf. iron, pgs. 3 123	Mf. iron, pgs. 3 123
Steel blooms, 3,000 6,000	Steel blooms, 3,000 6,000
Idw. cs. 57 999	Idw. cs. 57 999
British East Indies.	Brasili.
Val.	Val.
Ptms. gals. 612,000 71,900	Ptms. gals. 612,000 71,900
Rouen.	Brasili.
Val.	Val.
Ptms. gals. 127,196 10,914	Ptms. gals. 127,196 10,914
British North American Colonies.	Brasili.
Val.	Val.
Clocks, bxs. 24 256	Clocks, bxs. 24 256
Mf. iron, pgs. 3 123	Mf. iron, pgs. 3 123
Idw. cs. 7 175	Idw. cs. 7 175
Iron safe, 1 90	Iron safe, 1 90
British West Indies.	Brasili.
Val.	Val.
Nails, bxs. 3 123	Nails, bxs. 3 123
Ag. imp. pgs. 9 280	Ag. imp. pgs. 9 280
Mach'y, cs. 1 160	Mach'y, cs. 1 160
Burial case, bx 2 70	Burial case, bx 2 70
Ptms. gals. 12,171 1,518	Ptms. gals. 12,171 1,518
Idw. cs. 13 1,518	Idw. cs. 13 1,518

## PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St.,  
Philadelphia, Oct. 11, 1881.

**Pig Iron.**—While we cannot report any great activity in the market, prices are nevertheless firm, and in some cases a fraction higher. Along the whole line there is a gradual stiffening, and all that the very best buyer can do is to place orders at last week's prices. This condition of affairs is probably due to advances from abroad as well as to continued heavy consumption, and the strong tone of the market for all descriptions of finished iron. Supplies at present appear to be equal to all requirements, but there is an impression that consumers will increase their orders shortly, in which case a further appreciation in values is probable. To offset this, however, several furnaces are being prepared for relighting, and will, doubtless, be put in operation if prospects continue favorable. It is impossible to predict with any degree of confidence what turn the market will take, but at the moment, for reasons already mentioned, the indications are favorable for somewhat higher prices. At the same time there are elements of uncertainty which cannot be safely ignored. The crop reports, for instance, are far from satisfactory, and if the shortage is at all in proportion to the extraordinary advance in prices, the result may be far more serious than seems to be apprehended. Railway earnings will be watched with deep interest, and although the stock market is proverbially uncertain, it is possible that the recent break in prices is not altogether a temporary "bear" movement. When it is remembered that the vast expansion of business within the past two years has come chiefly from railways or interests connected therewith, it may well be feared that any serious falling off in earnings will be quickly felt in all departments of the iron trade. There is probably no reason to suppose that the immediate effect would in any case be more than a gradual slackening off in

business, but the matter is of sufficient importance to deserve careful consideration, especially by those who are looking for higher prices. The developments of the next three months will, therefore, be watched with the deepest interest, and in the meantime it is probable that the iron trade will continue their present conservative policy of buying only what they need, and producing only as much as can be marketed at fair prices. Sales during the week cover a range of \$21.50 to \$22.50 for Gray Forge, \$22.50 to \$23 for No. 2 Foundry and \$25 to \$26.50 for No. 1, with the majority of sales at \$25 to \$25.50 for No. 1 and \$22 to \$22.50 for Gray Forge.

**Foreign Iron.**—Middleboro' Iron is practically out of the market and generally held at \$20 for No. 3. There is very little here in any case, and as the cost to import is gradually increasing, holders are not inclined to make concessions. Scotch Iron is firmer, but not much called for, at \$22 to \$25, according to kind. Bessemer Iron is very quiet and no recent transactions have been reported. Prices are firm in foreign markets, and \$25 to \$25.50 is said to be the lowest at which shipments could be made, but buyers appear to be quite indifferent and make no offers likely to lead to business.

**Blooms.**—Are still scarce, and prices are steadily maintained as follows: Charcoal Blooms, \$72.50; Run-out Anthracite, \$60 to \$62.50; \$52.50 for Scrap Blooms, and \$47.50 for Northern Ore Blooms.

**Muck Bars.**—Holders are asking \$45, and it is reported that sales have been made at that price, but as a rule we cannot hear of much demand at over \$43. Holders are firm at \$45.

**Bar Iron.**—The mills are still crowded with business, but there is less difficulty in placing orders, especially for delivery during November and December. The outlook is quite as favorable as before, but the mills are making a larger production, so that there is less complaint of scarcity than there was a few weeks ago. An active business appears to be assured during the balance of the year, and, with consumption as large as it is, there is no apprehension of any important change in prices. As a rule, 2-7¢ is quoted at city mills, although exceptionally desirable orders may perhaps be taken at about 2-6¢. Store price continues firm at 2-8¢, and all departments report an active business.

**Structural Iron.**—In this branch of the iron trade unusual activity is reported. Manufacturers find orders steadily gaining on them, and they have not as yet made any perceptible headway, although their output is increasing. Prices are very firm, and orders for large lots have been taken at about 3¢ for Angles, 3-7¢ for Beams, and 3-9¢ for Channels. Plates for Bridge purposes, 3-5¢.

**Plate and Tank Iron.**—There is very little new business reported, for the reason probably that no large orders can be accepted. Business, therefore, is very much of a retail character, consumers taking small lots to serve them until such times as they can buy to better advantage. All the mills are fully employed, and it is said have enough work on hand or in sight to carry them to the end of the year. Prices are steady and firm, as last quoted, viz.: Tank Iron, 3-50¢; Refined, 4¢; Shell, 4-25¢; Flange, 5¢ @ 5-50¢; and Fire-box, 6¢ @ 6-50¢.

**Sheet Iron.**—The market is very active, and with light supplies prices are firm with an upward tendency. For small lots orders are taken at about the following quotations—large lots difficult to obtain:

Common Sheet, No. 26 to 28..... 5¢  
Common Sheet, No. 16 to 25..... 4-5¢  
Best Refined 1-4 @ 1-4¢ advance on the above.  
Best Bloom Sheets, No. 26 to 28..... 7¢  
Best Bloom Sheets, No. 26 to 28..... 6-5¢  
Common Red Plates, No. 16 to 21..... 3-5¢  
Blue Annealed, 3-16 to 16..... 3-7¢  
Best Bloom Galvanized, discount..... 3-5¢  
Second quality, discount..... 4-5¢

**Wrought Iron Pipe.**—The demand shows no abatement, and manufacturers are considerably behind with orders. Boiler Tubes are firm at 40¢ discount; Gas and Steam Pipe, 57 1/2 @ 60¢ from list price.

**Steel Rails.**—A very large business has been done, and prices are said to be a shade firmer. The demand for next year's delivery is likely to be beyond all precedent, and \$60 at mill is said to have been paid for large lots to be delivered during the first half of 1882. The most extraordinary feature is that heavy sales of foreign Rails are being made for American account, besides large quantities of Blooms, and still the demand is not satisfied. For roads in the South and Southwest, foreign Rails appear to monopolize the market. There is also a good deal of pressure to sell for delivery at Atlantic ports, but we have not heard of much actual business being done. From present indications it may be assumed that considerably over 1,500,000 tons Steel Rails will be called for during 1882; if not, it will be difficult to maintain prices, as over 1,000,000 tons are believed to be under contract already, and if sales are not kept up prices will soon weaken. It is difficult to quote actual transactions, but \$60 at mill, with occasional concessions of \$1 to \$2 per ton for favorable deliveries, is about as near the market as can be given. English Rails are offered at \$50 @ \$63, according to time and port of delivery, say \$60 at Atlantic and \$62 @ \$63 at Southern or Gulf ports.

**Steel Blooms.**—The market has been very active during the past week, and under heavy transactions prices have advanced freely 5¢ per ton. Sales have been made to the extent of about 20,000 tons, with several lots still under negotiation. Prices are a little irregular, some makes having been offered at \$43.50, duty paid, while others have sold as high as \$45. In sterling we have heard of sales at prices varying from £6.5¢ up to £6.10¢, one or two large transactions having been definitely closed at the last named quotation. To-day the market is firmer, and sellers are asking an advance of 2/6 @ 5/ on the above rates. In one case \$46 is quoted as best price, duty paid. Part of the advance, however, is due to the uncertainty in regard to freights from the other side, which are firm and advancing.

**Iron Rails.**—The market is unusually dull, and there is scarcely any inquiry for large lots. Manufacturers are beginning to look around for new orders, but at the moment prospects are not very encouraging. Small lots of 500 sell at \$47.50 @ \$48 at mill, but concessions would be made for orders in lots of 1000 tons and upward. English Rails are dull at about \$45.50, but no sales have been made so far as we can learn. Light Rails sell at \$48 @ \$52, according to weight.

**Old Rails.**—The market is unsettled, but prices are firmer. A few odd lots are still obtainable at \$27.50 @ \$28 in store, but the majority are held at higher prices. Stocks are believed to have changed hands during the week, and some parties anticipate quite a change in quotations before long, but unless there is some improvement in the demand for new Rails, it is hard to see how any advance can be maintained. Sales for shipment were made at \$28 a few days ago, and the same price is now offered, without takers. Double Heads are quoted \$30 @ \$30.50; sales at \$30, with \$30.25 bid, but a further advance is asked.

**Railway Fastenings.**—The demand continues large and prices are firm as last quoted, viz.: Spikes, 3¢; Fish Plates, 2-5¢ @ 2-6¢; Bolts and Nuts, 3-25¢ @ 4¢.

**Crop Ends.**—There is very little demand; holders ask \$26.50, but buyers do not respond.

**Old Car Wheels.**—Are held at \$28 @ \$30, according to make; demand at present quite light.

**Scrap Iron.**—There is a good demand and choice lots command full prices, say \$30 @ \$32 for No. 1; Medium and Short, \$28 @ \$29. Old Fish Plates would command about \$34 and are in demand, but we cannot hear of any being offered.

**Nails.**—The market is bare of stock and free sales are made at last week's quotation, say \$3.40, less usual trade discount.

## PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue,  
Pittsburgh, Pa., Oct. 11, 1881.

The weather has changed for the better. We have had considerable rain within the past week, which has given renewed life to vegetation, and the change in the temperature is favorable to our iron and glass manufacturers, whose output had been very much restricted, the men being unable to work much more than half time in consequence of the extreme heat. It is hoped that there will soon be sufficient water in our rivers to admit of a resumption of navigation, as the railroads centering here are so pressed with business that it is difficult—indeed, we might say impossible—to obtain prompt transportation. There has been a great deal of complaint in regard to the matter of transportation for some time past, and it is generally admitted that Pittsburgh needs increased railroad facilities—another outlet for the East and West.

**Pig Iron.**—There has been no important change in the situation since our last report; while for ordinary grades of both Mill and Foundry Iron, there is a steady consumptive demand, the market is devoid of excitement, and while prices remain unchanged, as compared with a week ago, the feeling is one of continued confidence on the part of furnace men, many of whom predict that prices will go higher within the next week or two. With the advent of cooler weather the consumption will be largely increased. Standard brands of Neutral Forge inclined to Red Short appears to be more inquired after than any other kind, and being in scant supply are held with considerable tenacity, and as several large contracts have been closed recently for Bessemer, it is evident that the production of ordinary grades of Mill and Foundry will be correspondingly reduced. We continue to quote at \$23.50 @ \$24, 4 mos., for that made from Lake ores, and \$22.50 @ \$23 for ditto from native ore. Foundry: We can report sales, mostly in small lots, at \$23, 4 mos., for No. 2, and \$24 @ \$25 for No. 1. Charcoal: Sale of Cold Blast at \$37, cash.

**Bessemer Iron.**—There has, as noted in our last report, been considerable activity developed recently, several large sales having been effected, and that, too, at an advance of \$1 @ \$1.50 per ton, as compared with a month ago. We can report a sale of 1000 tons, No. 1 at \$28, cash, and a couple of small sales, one of No. 2 at \$27, 4 mos., and the other of No. 3 at \$26.50, 4 mos.

**Muck Bar.**—There is still considerable inquiry for immediate delivery, but with the cooler weather the production will be largely increased, and mills that have been buying for some time past will be able to make about all they want. We continue to quote at \$41, cash, and \$42, 4 mos., for early deliveries.

**Manufactured Iron.**—At the regular quarterly meeting of the Western Iron Association last week, which was largely attended, about the only business transacted was the reaffirming of the existing card, which was passed unanimously. There appears to be no abatement in the demand, and the turning away of orders is still of common occurrence, particularly for immediate delivery. We continue to quote full card rates, 60 days, with the usual discount of 2¢ for cash.

**Nails.**—The activity noted for some time past continues, and the indications are that makers will have all they can do during the remainder of the present year. The light stocks in first hands are clearly attributable to the fact that manufacturers have been giving their attention to making Bars and other kinds of finished iron, as, until the last advance, all kinds of finished iron brought more remunerative prices than Nails. Then another encouraging feature lies in the fact that there is an entire absence of speculation; the demand is for actual consumption. We continue to quote at \$3.25, 60 days, with an abatement of 10¢ per keg on carloads and upward, and the usual discount of 2¢ for cash.

**Wrought Iron Pipe.**—The mills are still pressed with business. Prices remain unchanged. Discount on Gas and Steam Pipe, 57 1/2 @ 60¢; on Boiler Tubes, 40¢; Oil-well Casing, 82 1/2¢ per foot, net; ditto Tubing, 24¢.

**Rails, &c.**—We can report a sale of Steel Rails for delivery this year at \$62.50, cash, at mill; delivery in 1882 is still quoted at \$60 and upward, with most of the mills sold up for the first half of the year. Railway Fastenings continue active, with prices firm, but unchanged. Spikes, 3¢, 30 days; Splice Bars, 2-50¢ @ 2-60¢; Track Bolts, 3-50¢ @ 4¢.

**Steel.**—This important interest presents no particular change. The mills are all fully employed, and for some kinds of Steel they are unable to meet the demand. Prices are firm, but unchanged. Best brands of Refined Cast Steel, 11¢; ditto Crucible Machinery, 6 1/2¢; Bessemer and Open-hearth ditto, 5¢ @ 5 1/2¢; ditto Spring, 4¢ @ 4 1/2¢; ditto Plow, 4 1/2¢ @ 4 1/2¢. For Steel Boiler the demand is unprecedented, indicating that for Steam Boilers, Steel is supplanting iron to a considerable extent. We continue to quote at 6 1/2¢ @ 6 1/2¢.

**Scrap.**—There is a moderate business, but no change in prices. Wrought Scrap is still quoted at \$28 @ \$29 per net ton for Ordinary, and \$30 @ \$31 for Selected Railroad. Wrought Turnings sold at \$20; Old Car Axles and Car Springs, \$36 @ \$38. Some dealers quote up to \$40. Cast Borings in liberal supply and very dull, \$14 @ \$15, gross; Steel Rail Ends are still quoted at \$29 @ \$30 per gross ton; Old Car Wheels quotable, in the absence of sales, at \$28 @ \$30, gross.

**Window Glass.**—Business continues active; manufacturers sold from one to three months ahead, and prices are firm, but unchanged. Discounts 60 and 10 and 5% on single and 10 on double for carload lots, 60 days, 2¢ off for cash.

**Coke.**—This important interest is still held in check somewhat by scarcity of water and trouble in getting cars, although there is less complaint in regard to the former. There is great difficulty, however, in getting cars, and the business of those operators dependent upon the railroads for cars is very much crippled in consequence. Prices remain unchanged; \$1.60 per ton, free on cars at ovens; \$1.70 @ \$1.75 for small foundry orders.

## CHICAGO.

Office of The Iron Age,  
36 and 38 Clark Street, cor. Lake Street,  
Chicago, Oct. 10, 1881.

**Pig Iron.**—No perceptible change has taken place in the market. Lake Superior Charcoal Iron remains firm and the demand active, while the same may be said for other brands for which quotations are given below, with the exception that there is an upward tendency shown. Deliveries are not quite as good as they might be, owing to the blockade in freights, dealers being unable to get cars fast enough to meet their requirements. We quote for Lake Superior Charcoal, No. 1 and 2, \$31; No. 3, \$32; No. 4, 5 and 6, \$33 @ \$34; Calumet No. 1, \$27; No. 2, \$26; Crane X, \$29; XX, \$27; Thomas, \$27 @ \$30; Scotch Imported, \$29 @ \$30, 4 mos.; American Scotch, \$25 @ \$28; Silvery Soft, \$24 @ \$26.

**Manufactured Iron.**—The tone of the market is constantly improving; the demand is active, the only drawback being the scarcity and ill-assortment of the supply on hand. We quote: Bar, 3¢; Angle, 3-80¢; T, 4¢; Hoop at 3-80¢ rates; Sheet, Plate and Tank, 10 to 14 gauge, 4¢; 15 to 17 ditto, 4-30¢; 18 to 21 ditto, 4-60¢; 22 to 24 ditto, 4-80¢; 25 and 26 ditto, 5¢; and 27 ditto, 5-00¢.

**Nails.**—There is no change to note since our last writing. Stocks are comparatively light, and the demand still continues active. We quote for 10d to 60d, in less than carload lots, \$3.40 per keg, and 10¢ off for carload lots, with the usual discount for cash.

**Steel.**—The following are the ruling quotations, which are firmly adhered to, for Tool, Machinery and Steel for agricultural purposes. The demand continues good: Tool, 1 1/2¢; Machinery, O. H., 5 1/2¢; Crucible Machinery, 7¢; Hammer 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 6 1/2¢; and O. H. Spring, Tire and Sleigh Shoe, 5¢. The quotations on this latter class of Steel would be shaded a trifle on large lots. Sheet, first, second and third quality, 12¢, 10 1/2¢ and 8 1/2¢, respectively; Crucible Plow, 6¢ @ 6 1/2¢; Eagle Plow, 5 1/2¢; Iron Center Plow, 10 1/2¢; and soft Steel Center Plow, 10 1/2¢.

**Scrap Iron.**—We have no change to note in this market. The demand is fair. We quote: No. 1 Forge Scrap, \$30; No. 1 Wrought, \$24; Heavy Cast, \$20, and Stove Plate, \$13.

## CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts.,  
Chattanooga, Oct. 10, 1881.

Prices of all manufactured and raw materials continue very firm in the Southern market. Press reports and observation of commercial men in the cotton belt induce a rather hopeful view of business in that region during the winter. The crop is not going to be as large as that of last year, but it will bring more money, and, as this report has before stated, the merchants who have most at stake are laying in liberal stocks. Dealers in planters' implements and hardware look for a good trade. The weather has been very cool at night for the entire week, heavy frosts occurring in the mountains of Tennessee, as well as North and South Carolina.

**Pig Iron.**—There is nothing to remark in the trade except the old story of good demand at outside rates. We quote No. 1 Foundry, \$22 @ \$23; No. 2 Foundry, \$20 @ \$21; Gray Forge, \$18 @ \$19; White and Mottled, \$16 @ \$18; Car-wheel Metal, \$38 @ \$40.

**Ores.**—We quote: 50¢ Brown Hematite, per ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnace.

**Miscellaneous Articles.**—Old Rails \$26 @ \$28 per ton, mostly shipping demand. Wrought Scrap, \$20 @ \$25; Cast Scrap, \$10 @ \$15; Old Wheels, \$25 @ \$30.

**Nails.**—Continue stiff at \$3.25 rates. We look for no let down in the market until winter stops building operations in the North and Northwest.

**Manufactured Iron.**—Bar is steady, with demand for all the mills can produce at \$2.75. We quote: Railroad Spikes, \$3.30;

Track Bolts, \$4.25; Fish Plate, \$3. The advance in this list is well maintained, and promises to hold up for some time.

**Coal.**—We quote Lump at \$4.25; run of mine, \$2 at mills.

**Coke.**—Furnace Coke, \$3 at point of consumption; Foundry, 10¢ @ 12¢ per bushel.

**Steel and Iron Rails.**—Steel Bars, \$62 @ \$64 at mill; Iron, \$50 @ \$52; Small, \$57 @ \$60.

## BOSTON.

OCTOBER 8.—The market displays a firmer feeling, and tendency at present is upward, and not many would be surprised were a slight rise to take place. The demand has remained about the same at last week, that is, there is a very good consumptive inquiry, and the amount of business done has been large. There still remains, however, considerable difficulty in obtaining any large amount of a desirable brand for prompt delivery. Prime brands are scarce, and except occasionally in lots of a few hundred tons or so from dealers, they cannot be had, and some of the consumers have not iron enough to meet their requirements. It is reported that many of the furnaces are sold ahead for two months, and some have already orders enough for the remainder of the year. The cooler weather which is now setting in will probably lead to a larger consumption. The prices of foreign Pig have again advanced, and reports from abroad show the market in buyers' favor. Though no quotable advance has taken place, the market can be truly reported, though rather quiet, as stronger and firmer than last week, with an upward tendency.

**American Pig.**—Prices are holding firmly. Prices at shipping ports are: \$24.50 @ \$26 for No. 1 X; \$22 @ \$23 for No. 2 X, and \$20 @ \$21 for Gray Forge. Small spot lots command \$2 @ \$3 per ton above these quotations.

**Foreign Pig.**—The market is again reported to



No. 1 Stonecoal and Coke, Cold-short and Neutral.....	21.00	21.50
No. 2 Stonecoal and Coke, Cold-short and Neutral.....	20.00	20.50
No. 1 Missouri and Indiana Red-short and Neutral.....	25.00	27.00
White and Mottled, Cold-short and Neutral.....	18.00	19.00

## CAR WHEEL AND MALLEABLE IRONS.

Hanging Rock, Cold-blast.....	35.00	41.00
Alabama and Georgia, Cold-blast.....	35.00	38.00
Kentucky Cold-blast.....	35.00	40.00
Hanging Rock, W. B.....	29.00	33.00

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 113 and 115 Main street, report to us as follows, under date of Oct. 8: Bars are still scarce, the principal demand being for tires  $1\frac{1}{2} \times \frac{1}{2}$  and larger. So many mills make a specialty of guide iron that at full card there is not much difficulty in getting a supply of the latter. Idle mills here and there are starting up again, and we are advised by their agents that as they are unencumbered by old orders prompt delivery may be expected. There seems to be no change in the situation at Cincinnati, but some rumors of putting the mills at this point into operation. Sheet is now offering from several quarters, as the impression prevails that it is about as high as it is apt to go. The heavier sizes of sheet cost not far from  $4\frac{1}{2}$  laid down, while No. 27 may be quoted at  $5\frac{1}{2}$  @  $5\frac{1}{4}$ , with none in the market. Galvanized Iron and Wire are held at the late advance. Nails are firm, and the supply cut short again by low water. Business is good, though the drought has hurt some portions of this State very badly.

## CINCINNATI.

OCTOBER 10.—Pig Iron.—The market remains about the same as last quotations, supply and demand sustaining the same relations as before. No. 1 Coke and Stonecoal Irons are short in supply, and prices  $5\frac{1}{2}$  higher than last quotations. The Silver Gray Softeners are scarce, and share the advance in the Coke and better grades Stonecoal kinds. There has been no move in Charcoal Foundry Irons, except in lots for immediate use, and at very firm prices. Hanging Rock Hot Blast Charcoal Foundry No. 1,  $\$26.50$  @  $\$27.50$ ; Coke,  $\$24.50$  @  $\$25$ ; No. 2,  $\$23.50$  @  $\$24.50$ ; Stonecoal,  $\$24$  @  $\$24.50$ ; No. 2,  $\$23$ ; Silver Gray Softeners,  $\$21.50$ ; No. 2,  $\$22.50$ ; No. 3,  $\$21.50$ ; Cold-blast Charcoal Car Wheel,  $\$35.50$  @  $\$38$ ; Warm-blast, Charcoal Car Wheel,  $\$28$  @  $\$28.50$ .

## Our English Letter.

## Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., Sept. 26, 1881.  
PRESIDENT GARFIELD.

It is impossible for any one having even the most remote connection with the United States or its press, to pen any communication at this time without making reference to the feelings of sorrow and sympathy which are shown on all sides for and with the great American nation and the lamented death of President Garfield. I am strictly within bounds when I assert that the almost marvelous recovery of the Prince of Wales; indeed, I almost think the present occasion possesses a fullness and depth which were missing then, simply because the Prince recovered. Within twelve hours of the posting of my last week's letter to you, the sad news of the President's death reached London, and was published in special editions of the newspapers throughout the country. That was on Monday last, September 19th. Since then the tears of the British nation have literally been mingled with those of the American people, and the melancholy ceremonies attending the removal of the body, and the preparations for the last sad scene of all, have taken precedence of everything else. The newspaper press has devoted an enormous amount of space to details of every movement on your side—even the solid and dry trade journals having given a tribute to the memory of the brave and good man whose praise seems to have been on every tongue. In fact, the two countries have been united together more closely than at any former period, and their community of language and literature has eventuated in a common and heartfelt sorrow. It is not for me in this place to descant upon a theme which more properly belongs to the general press, but even *The Iron Age* may fitly devote a small portion of its space to the record of a sympathy which has knit two worlds together, and has shown the grand and touching spectacle of the leading communities of the Anglo-Saxon race weeping over the broken life and worthy career of your chief magistrate. Were I so disposed I might well fill a huge volume with the kindly expressions of sympathy which have found vent here. From our good Queen downwards, all classes have sent their tribute, and every man, woman and child in this country has shed a tear over the tomb of James A. Garfield. The thousands of Americans in this country have naturally taken other steps. Nearly 4000 met here on Saturday, when your talented Minister, Mr. Lowell, made a speech which was simply perfection in matter and manner. To-day, as I write, the mortal remains of the murdered President are being interred 4000 miles from this city, yet we have our shops and offices closed, our church bells are ringing muffled peals, private houses display signs of mourning, and men are speaking of little else. So it is in every part of Great Britain. Distance is abolished, and you, our offspring, may safely claim to have the eyes of Europe upon you in a sense never known, never conceived before. Certain it is that the great heart of this nation is touched as it has never yet been touched—probed to the very core. The occasion is most painful, unique in the annals of history, but we may hope that the result will be beneficent and lasting. The bonds of sympathy and of brotherhood will be drawn warm and tight by the event, and we may hope to understand each other, as good friends and near relatives should, better in the future than we have done in the past. If this should be the happy outcome, then

Guiteau's crime will not have been wholly in vain, and James A. Garfield will not have had his martyrdom for naught. So may it be.

## THE IRON TRADE

is moving. We are not yet booming, but we are pretty near to the starting point for that sort of amusement; indeed, I would not hazard the statement that we are not already upon the first rounds of that steep and risky ladder. The rise in crude iron has given everything a jump, and it would not be at all surprising to witness a full repetition of the 1879 excitement and a further very considerable advance in values, together with an amount of inflation which would have no slight weight with your market. All doubt as to the complete accomplishment of the scheme for restricting the production in Scotland and the North of England has now vanished. On Monday last the committees from the two localities met at Carlisle and speedily arrived at an amicable understanding. It had been assumed that no definite result would be arrived at, but this view proved to be unfounded, both the parties being animated by a desire to do something in the way of reducing the excessive output which your correspondent has so long deprecated. The Scotchmen came prepared to blow out 20 per cent. of the furnaces, but it was found to be impracticable to proceed on that basis, hence it was ultimately agreed that  $12\frac{1}{2}$  per cent. of the furnaces now at work should be stopped in both districts for a period of six months from October 1. Under this plan about one-eighth of the present make will be the extent of the diminution, or about 14 or 15 furnaces in each locality, equal to the production of 4000 tons or so weekly in Scotland, and 6000 to 6500 tons in Cleveland. The stoppage will be operative during the autumn and winter, when the export demand is ordinarily least, and should tend to reduce stocks to a considerable extent during its continuance. For a time the reserves may not be largely affected, save in the way of preventing their increase, but a month or so of the lower rate of output should make an appreciable difference. It is not quite clear why the Cleveland smelters should have placed themselves on the same basis as their brethren in Scotland, where the output per furnace is only about 50 per cent. of that of Cleveland, but the fact is as stated, and as it stands is all the more favorable to the prospects of trade. One cannot help asking why so obvious a remedy was not applied some months ago, but in the absence of a satisfactory response it only remains to accept the action of the ironmasters as a species of repentance which is "better late than never." It is probable that the agitation of the coal miners in Scotland is an important factor in the movement—indeed, Mr. Macdonald, M. P., has stated his belief to that effect, and has advised the miners to cut the ground from under the ironmasters' feet by at once reducing the output of coal by working only four days weekly of eight hours per day. It is not very easy to perceive how this sapient remedy would work out in the manner indicated. If adopted this advice might bring about other and probably unforeseen results, but these are not within the conception of Mr. Macdonald, who is not renowned for his foresight or prudence. Should a conflict take place it is possible that more furnaces would be stopped than those mentioned, and iron would then experience a very rapid elevation. Thus far the broad result has been an enormous influx of speculation into the iron ring at Glasgow, and daily advances in warrants, which have gone up at least  $5\frac{1}{2}$  per ton since the project was mooted a fortnight or so ago. Makers' prices in Scotland and Cleveland are also  $2\frac{1}{2}$  to  $3\frac{1}{2}$  dearer, and crude iron in every part of the country have moved up in proportion. Hematites are stiffer, and likely to become much firmer still should the existing demand hold. Finished iron is also "all afloat" once more, sheets being  $5\frac{1}{2}$  to  $6\frac{1}{2}$  dearer, common bars  $5\frac{1}{2}$  to  $6\frac{1}{2}$  dearer, and plates  $5\frac{1}{2}$  higher on the week. Marked bars have not undergone any official alteration, but manufacturers are declining to sell more than a week forward, and state that they are firm believers in the establishment of a  $10\frac{1}{2}$  or even  $11\frac{1}{2}$  advance at the forthcoming quarterly meetings, which will be held on October 12 and 13th. At present, marked bars range from  $\$7$  @  $\$7.10$ , with the usual  $12\frac{1}{2}$  extra for Lord Dudley's round oak iron. Common bars,  $\$5.15$  @  $\$5.20$ ; they are not unlikely to be  $\$5.50$  a week hence. A remarkably brisk demand has set in for all sorts of manufactured iron, so that the new "boom" is not wholly attributable to speculation, although there is no doubt whatever that both the bulls and the bears have contributed to the establishment of the new order of things. Our current reports from every leading iron district of Great Britain, as well as those from the Continent, are most hopeful. With any new departure "on the up line" with you I feel sure we shall have a tremendous rush for iron and resulting high prices. Much depends still upon your market, and as stocks of English iron in your ports are now exhausted, while there is still a good demand for Scotch, Cleveland, &c., brands, it is difficult to resist the impression that we are on the eve of sending you another considerable lot of our surpluses. There is ample evidence in favor of this idea, at all events, and I fancy the iron will soon be on its way to your shores. With moderate consignments no harm may be done; but if moderation be not shown, the inevitable outcome of the situation will be a decided break in prices, both here and in the States. The *Ironmonger* says: "For iron rails there is a fairly good inquiry, but makers, being full of work for the present, ask  $\$5.75$  per ton for November and forward, although they would no doubt accept less were large orders forthcoming. Old rails are steady, and D. H. especially firm. These have been sold afloat at about  $\$4.60$ , and  $\$4.75$  is offered here for October shipments, but is declined. The railway companies are now the principal holders, and they appear satisfied to retain the rather slight stocks they possess for a further rise in values. Old flange rails are not nearly so much sought after and are nominal in price. A few small lots are on offer by weak holders, who, having taken up freight, are becoming

anxious as to the bill of lading dates. For heavy wrought scrap iron  $\$3.14$  @  $\$3.15$ ; c. i. f. New York is offered, with the condition that weight and quality are guaranteed, but responsible sellers decline such conditions, and prefer that buyers should inspect during shipment. For old cast-iron railway chairs  $\$2.40$  @  $\$2.60$  is quoted, and for other old cast metal,  $2/6$  @  $5/6$  more. There is a good demand for Bessemer blooms for the United States, and the few lots offered for forward shipments have been eagerly taken up by agents and others at about  $\$5.10$  per net ton; old railway leaf spring steel is in request at  $\$5.12/6$  per ton, net cash, but there is little on offer, and holders ask about  $2/6$  per ton more than that price." Steel rails are still at  $\$6.10$  for long-dated future deliveries. Nothing near is obtainable.

## SCOTCH PIG IRON

is much higher than a week ago, and all its surroundings betoken much excitement, an enormous amount of speculative buying and selling, and every probability of higher prices. The question of reducing the make  $12\frac{1}{2}$  per cent. was settled on Monday, and confirmed on Friday by a full meeting of Scotch ironmasters at Glasgow, so that it is beyond question that the idea will be practically embodied after the end of the week. At the time of this writing there are 112 furnaces at work (besides 9 on hematites), against 82 this date last year. Fourteen or 15 will be stopped on Saturday next. The daily prices of warrants last week were: September 10,  $50/49\frac{1}{2}$ ; 20,  $51/49\frac{1}{2}$ ; 21,  $51/49\frac{1}{2}$ ; 22,  $51/50\frac{1}{2}$ , and 23,  $51/51\frac{1}{2}$ . To-day the market has been closed on account of President Garfield's funeral. The shipments last week were 3661 tons ahead of the corresponding week of 1880. Up to date shipments have decreased 107,193 tons. Importations from Cleveland into Scotland have increased 36,306 tons. An addition of 2348 tons was made to Connal's stocks last week, bringing up the total to 586,802 tons, against 472,395 tons a year ago. Ballast pig is  $42/6$ , and steam freights to New York are  $10/11$ , with an upward tendency. Writing from Glasgow, September 23, James Watson & Co. said: "The iron market this week has been excited and irregular at higher range of prices, a very large business being transacted. On Monday the opening price was strong at  $50/$ , afterward receding to  $49/6\frac{1}{2}$  per ton; that afternoon a joint meeting was held at Carlisle of the committees of the Scotch and Middlesbrough ironmasters, at which it was resolved to restrict production  $12\frac{1}{2}$  per cent. per six weeks. On Tuesday, therefore, the market here responded, and a very large business was done between  $50/3$ ,  $49/11$  and  $51/$  per ton. On Wednesday the price was very irregular, opening at  $51/$  it went straight back to  $49/3$ , afterward rallying to  $50/2$ , and closing at  $49/10$ , cash. Yesterday the market was again irregular, with transactions between  $50/1$  and  $51/$ , closing at  $50/10\frac{1}{2}$  per ton. To-day the market opened at  $51/$ , and with considerable excitement it advanced to  $51/10\frac{1}{2}$ , 14 days, afterward it relapsed to  $51/1$ , at which it closes. There has been fully more doing in shipping brands, and quotations are all advanced in sympathy with warrants. The shipments last week were 14,449 tons, as compared with 10,785 tons for the corresponding week of last year." We quote:

	No. 1	No. 2	No. 3
G. M. B., at Glasgow.....	51/6	49/6	47/6
Gartsherrrie, at Glasgow.....	50/	48/6	46/6
Coltness, ".....	51/6	49/6	47/6
Summerlee, ".....	50/	48/6	46/6
Langloan, ".....	51/6	49/6	47/6
Caldor, ".....	50/	48/6	46/6
Glengarnock, at Ardrossan.....	50/	48/6	46/6
Edinburgh, ".....	51/6	49/6	47/6
Dalmellington, ".....	50/	48/6	46/6
Shotts, at Leith.....	51/6	49/6	47/6
Kinnell, at Bo'ness.....	50/	48/6	46/6
Carron, at Grangemouth.....	51/6	49/6	47/6

## CLEVELAND PIG IRON

has undergone a decided enhancement of values, in sympathy with the general improvement in business and the rise in Scotland. Warrants have gone up, and No. 3 pig has been sold as high as  $42/6$  @  $43/$  per ton. At the moment quotations for G. M. B., net cash, at makers' wharves in Tees, are:

	No. 1	No. 2	No. 3
Foundry.....	45/	44/	43/
White.....	44/	43/	42/
Refined Metal.....	44/	43/	42/
Kentledge.....	44/	43/	42/
Forge.....	44/	43/	42/

Everything means a lively appearance throughout the North of England, and many large new orders have been placed. Ship plates and other iron have been advanced  $5\frac{1}{2}$  per ton during the week, and will probably move up in proportion to the augmented values of raw materials. Bolckow, Vaughan & Co.'s weekly output of steel rails is now stated to be 4000 tons, but no particulars are obtainable. Perhaps you will take the opportunity of interviewing Mr. Windsor Richards while he is in the United States.

## HEMATITES

are growing firmer and dearer each succeeding week, and are almost certain to reach much higher limits within the next four or five weeks, as the Bessemer works are all crowded with orders, and are in most cases running day and night to keep faith with their shipping season deliveries. There is no stock worth mentioning in second hands, and producers have some difficulty in keeping up their consignments by reason of the great current pressure. Prices are:

	No. 1	No. 2	No. 3
Cleator.....	65/	64/	63/
Lonsdale.....	60/	59/	58/
Workington.....	60/	59/	58/
West Cumberland.....	60/	59/	58/
Lowther.....	60/	59/	58/
Moss Bay.....	60/	59/	58/
Distington.....	60/	59/	58/
Harrington.....	60/	59/	58/
Silway.....	60/	59/	58/
Maryport.....	61/	60/	59/

There are 60 furnaces blowing on the West Coast and 21 out. Last week's shipments were: Of pig iron, 17,308 tons; of steel rails and blooms, 8054 tons; total, 25,362 tons, not including railway and local deliveries.

## TIN PLATES

have not as yet shown any signs of participation in the renewed activity which has made itself manifest in the ordinary branches of the iron trade of this country. Under the circumstances, however, I think they will shortly share in the general im-

provement, as it will not be possible, or at all events likely, that the manufacturers of these goods will continue to sell at the rates now obtaining, in the face of dearer sheet iron and dearer tin, with every probability of dearer fuel. Sheets have become fully 10/ higher within the past month, and makers are much pressed with work. Tin is very firm, and the metal market generally is in accord with the iron and steel industries. Existing contracts may, of course, defer the declaration of any change for a time, but it is an accepted axiom that one never knows what may happen in an excited rising market. The production is believed to have become pretty even with the make, but the exact position of stocks at Liverpool is not precisely known, save to a few parties whose interest it is not to divulge the information. It has been proposed to establish an efficient system of storage, with warrants and regular statistics, but the idea has never been thoroughly pushed and has been permitted to fall through. With a good fall demand from your market, I am of opinion that prices will slowly grow stronger. Should exact information leak out as to the reserve stocks, the rise would be influenced thereby. At present ordinary cokes range from  $16/$  to  $16/6$ , and charcoal from  $19/6$  to  $23/$  per box, in London or Liverpool, or 6d. less in Cardiff, Swansea, or Bristol.

## FOREIGN.

## FRANCE.

(Moniteur des Interets Maternels.)  
PARIS, Sept. 25, 1881.—Metals.—The fall trade develops normally, unimpeded by the war in Northern Africa, except so far as the forwarding of provisions to feed the army there is concerned, which is going on actively. Metals have all of them improved in value under the impulse of a good consumptive demand and favorable news from London and Holland. We quote: Copper, 118.50; Best Selected, 117.25; and pure Corocoro Ore, 161.25. Tin—Banco, 355; English Refined, 360; Billiton, 352.50; and Straits and Australian, 351.50. Lead, 38.25 @ 39.25; and Spelter, 43.75 @ 44.25. Iron.—The recent advance at Paris is now carried over to the market here, and the ensuing price list: Merchant Iron, 10 @ 10.50 francs the 100 kilos; Beams, 20.50; Common Sheet Iron, 26; and large Plates, 23. In the Haute-Maine there is a good run of trade, the demand coming from quarters usually not buying in the Champagne, which is about the best sign of the firmness elsewhere. In this manner the rolling mills have been able to fix the price of Coke Merchant Iron at 10 @ 10.50, and at 21 @ 21.50 for mixed quality. Machine and Sheet are in most urgent request in the locality; in fact, the latter cannot be had under 24 francs. It is considered a favor to let you have any at all. In the Ardennes makers have secured work enough to last them for a number of months to come. Still, an actual further advance is not reported from there, but, of course, prices are quite stiff. No. 2 Merchant iron commands in the Ardennes 17.50 @ 18 francs, first-class. Coal.—People begin to lay in their winter supplies, which leads to considerable business in the coal trade. In the North and the Pas de Calais great liveliness is noticeable. Shipments at St. Etienne are steady.

## BELGIUM.

(Revue Universelle.)  
BRUXELLES, Sept. 25, 1881.—Iron.—There has been no further improvement in the price of iron in this country, but great firmness is noticeable on all hands on the part of 13 francs for Merchant Iron and 1 franc difference per number. Both Puddle and Foundry Pig remain firmly sustained in consequence of the active demand. Sheet Iron is not quite as lively as it has been. The general situation in Belgium remains a sound and promising one; all works are busy. There are, indeed, but few willing or able to bind themselves to furnish large quantities of iron in the near future, having, as they do, most of them enough work engaged to last them a long time. As for a further advance in the price of iron in Belgium, we are not sanguine about it, for we are now approaching the end of the fall season, nor would it be either prudent or desirable to push prices much further than they are at present; by doing so we should only frighten away orders from abroad which may be welcome to many to bridge over the dull winter months. It would be different if we were at the commencement of a campaign. Prices as they rule at present are remunerative to the maker and not too high for the consumer. We believe the majority of ironmasters take a reasonable view of things as they stand among us at present, and would be opposed to any very great further advance. In England Pig Iron is firm and it cannot be had under 6.10 francs. Beams are now bringing as much as 14 @ 14.50 in Belgium, a price which few were sanguine enough to expect at this time ago. Coal is active; the demand extends pretty much to all sorts.

## GERMANY.

(Borzenhalles.)  
HAMBURG, Sept. 24, 1881.—Iron.—On the lower Rhine and in Westphalia the tendency both in iron and coal remains a favorable one. Puddle Pig is now very active in Upper Silesia, business being restricted to the delivery of the iron on former contracts, but inquiries continue to be made by both consumers and speculators. The rolling mills are loaded down with orders; they, therefore, intend to keep prices very soon. As for the coal trade, it is unusually active, so that there have not been cars enough to load all the coal sold. Official statistics of the foreign iron trade of Germany last year are published. From these tables we extract the ensuing items, reduced to millions of marks:

	Import.	Export.
Iron ore.....	12.1	15.2
Pig iron.....	17.1	17.1
Scrap iron.....	0.5	10.6
Rod iron.....	3.0	21.0
Sheets.....	0.6	7.7
Wires.....	0.9	20.1
Other merchant iron.....	1.3	3.5
Rails.....	0.2	30.0
Hardware.....	13.4	86.7
Total.....	46.4	221.1

This shows that the import slightly exceeded one-fifth of the export. Iron Ore principally came from Spain, and Pig was chiefly imported from England. The following concerns have bought of the Hoerde Union and Rheinisch Steel Works the license to use the Thomas-Gilchrist process: Stumm Brothers, of Neunkirchen; the Dillingen Works, Gienauth Brothers, of Kaiserslautern; Wendel & Co., Hayange; Dietrich & Co., Niederbrunn; the Luxembourg Co., Burbach; the Ailsa-Chapelle Co., at Rothe Erde; the Lorraine Iron Works, Ars sur Moselle; the Maximilian Works, near Homburg; the Bochum Union, the Dortmund Iron and Steel Co., the Gutehoffnungshutte, the Oberhausen Works, the Phoenix, and finally the Laar Co., near Ruhrort. Metals.—More business has been transacted, and the market closes with considerable firmness. We quote: Lead higher, say English Pig, 15.50 @ 17; ditto Sheets, 17 @ 17.20; German Pig, 15.20 @ 15.40; Spanish, 17.50 @ 17.80. Copper is firmer. We quote: Brouha's 68 @ 69; Waterloo, 62 @ 63; Electrolytic, 5. A. 75 @ 76; Lake Superior, 78 @ 80, and English Refined, 68 @ 69. Tin is higher; English Refined, 106 @ 108, and all other sorts 204 @ 106. Spelter has improved. We quote: Silesian, 16 @ 16.25 marks per 100 kilos.

## (Cologne Gazette.)

DUSSELDORF, Sept. 27, 1881.—Iron.—We receive the following intelligence from Dortmund, dated yesterday: "The iron situation continues in a satisfactory condition. Pig iron in particular is selling well. Dortmund Foundry Pig has risen in price 2 marks per ton, in response to the improved tendency in the Glasgow and Middlesbrough markets; No. 1 is now quoted 77 marks. Dortmund Puddle Pig, Spiegeleisen, and Bessemer Pig remain unaltered. Consumption is very great

of all these; blast furnaces expect higher prices, and do not feel inclined to sell distant futures. Merchant Iron is also quite active. Large orders have been dropped in for Rod Iron, Rails for mines, corners, coarse Sheets, Steel Ingots and Rolled Wire. Thin Sheets are also in better request; thus now the Siegen rolling mills likewise demand a longer time for delivery, which has been the case for some weeks past with the remaining works. No further advance can be noted; present prices are as yet not very remunerative, the basis still being for Rod iron 120 @ 150; 200 @ 210 marks for Boiler Sheets, and 175 @ 180 for Siegen thin Sheets. Steel works are very busy, but they will from now forward be glad to receive additional commands. The Upper Silesian Railway will, for October 12, receive tenders of 2302 tons Rail and other material. By rail and water down the Rhine large amounts of Rails, Steel Ingots and Spiegeleisen are now being shipped to Rotterdam and Antwerp, navigation on the Rhine being facilitated by deep water just now. The freight rate through Elba, Algeria and Spain (Bilbao and Cartagena), used for the making of Bessemer Pig. The boiler makers, shipyards on the Rhine, galvanizing works, machine shops and foundries are all busy. Some of the bridge building contracts have now received some heavy fresh orders, but the bulk of them are less fully engaged. This relates to locomotive and car works, likewise. Everything combines to create great animation in this fuel. In Upper Silesia good headway is made in iron industry, so far as activity and tendency are concerned. An advance in Pig iron seems to impend. Stocks of Rod Iron and Sheets are nearly exhausted. Fine and heavy wholesale dealers, while the works have got orders enough to last them during what remains of the year and even beyond this. The improved exchange rate on Russia has facilitated exportation thither of Merchant Iron. Coal is doing well in that region.

## AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Sept. 25, 1881.—Iron.—Pig Iron is remarkably firm, with an improving tendency. Efforts are made to establish a rise in Merchant Iron. Pillars are a little less active, but Sheets and other manufactures in the line remain active, and quest at steady rates. The general situation of the iron and steel branch in Austria remains a decidedly favorable one, the demand being good throughout nearly all its departments, and if there are still a few complaints about insufficient sales, they relate to specialties merely or are due to some local cause with which the iron trade has nothing to do. The advance in Rod Iron previously alluded to as about to take place, has been carried out only in part, being limited to the make of the Ternitz and store companies, which raised the price 3 florins per ton. They are presumed to be overloaded with orders. The remaining rolling mills do not feel disposed, it would seem, to advance the price; nor has a rise been effected in Bohemia, for many of the works there are connected with Silesian concerns, and these do not wish to raise the price at present; they fear competition from Prussian Silesia. In Hungary there was a meeting on September 15, but makers resolved not to raise the price. This shows that most of the rolling mills in Austria-Hungary are not in a hurry to enhance rates; their experience 18 months ago has not been forgotten by them, and they prefer to keep up a good trade at current moderately remunerative prices rather than force the consumer to buy in neighboring countries. Rail makers are loaded down with work. A great demand exists for common Sheet Iron. Tin Plates are neglected, as heretofore. All Hardware and Wire show considerable liveliness and buoyancy. Prices are unchanged. Metals, though in better request, are also unaltered.

## EAST INDIES.

(Gillilan, Wood &amp; Co.)

SINGAPORE, Aug. 18, 1881.—Tin.—The market closes with sellers at  $\$29$  and buyers at  $\$28.75$  per picul. During the fortnight 300 tons changed hands at  $\$28.62\frac{1}{2}$  @  $\$29$  per picul, and of this quantity 135 tons were resales by Europeans. So far, the shipments to the United States this month amounted to 430 tons. Freight.—The market has continued dull, and no fresh business has been done for the United Kingdom. Rates have, however, we think, touched bottom, as shipowners are sending their vessels in other directions rather than accept current rates. For New York the Mindet and Enrique have cleared, leaving the Elwell on the berth. The Mindet took 500 piculs Tin. For Boston, the H. G. Johnson continues loading. Exchange.—Is firm at  $3/4$  for 6 months sight private drafts on London.

(Schmidt, Kustermann &amp; Co.)

PENANG, Aug. 27, 1881.—Tin.—There has been a good demand for the East, leading to notable shipments to Singapore; but prices have remained unaltered. The market opened a fortnight ago at  $\$28.60$  per picul, since when it has fluctuated between  $\$28.20$  and  $\$28.45$ , closing more firmly at  $\$28.50$  under a Chinese demand for Singapore. Receipts were 6100 piculs, against sales of 5850, inclusive of 400 piculs resales. Stock in bazar 1200 piculs. Exchange has remained steady throughout at  $3/4$  for 4 months' bank bills.

A New Thermograph.—Dr. W. D. Bowtell, of England, has invented a new instrument for recording changes of temperature as measured by the action of heat upon a hollow circular metallic ring connected with a circular vessel, the whole being filled with fluid and hermetically sealed. One end of the ring is fixed, the other free to move, and the amount of motion is magnified and measured by a series of levers, one end of which carried the recording pen. Increments of heat cause increments of pressure in the ring, which, as in Bourdon's pressure gauge, then moves at its free end. The instrument is adapted for many purposes of chemical and physical research.

Molds for Casting Steel under Pressure.—Mr. C. J. Allport, of London, proposes to use asbestos for making the joints of molds for casting steel and other metals under pressure. The method of accomplishing it is to either use strips or rings of asbestos, millboard, or asbestos fiber made into a gasket between the bottom of the ingot mold and the bottom upon which it stands, and the lid and the top of the mold, and if the mold is made into more than one piece, between the joints of the different pieces.

One of the most frequent causes of disturbance of the telegraphic connections in Japan is found in the threads of spiders, which, in the vicinity of large forests, connect the wires and insulators with the surrounding trees and the ground. These threads, moistened by heavy dews, become conductors of electricity and allow the current to pass into the ground. There is no other remedy than to sweep the wires with brushes; but, since the spiders are more numerous and more persevering than the persons employed by the telegraph companies, it becomes necessary to repeat the operation almost daily.

Among the recent improvements introduced in England in building large steamships are hollow steel shafts, which are chiefly manufactured by Sir Joseph Whitworth & Co. According to this system a 10 inch shaft has a hole 4 inches in diameter, reducing the weight 16 per cent., while the strength is diminished by only 2.56 per cent. With a 5-inch central hole these figures would be .25 and 4.25 per cent., respectively.



## WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., Oct. 12, 1881.

From all accounts received here the British free traders and their allies in the United States are making quiet, but none the less energetic and desperate, efforts to create a feeling in favor of their intrigues to sap and undermine the industrial interests of the country, by the adoption of inimical legislation in Congress under the guise of divers well-sounding terms. Finding that the designation "free trade" has become obnoxious to the sentiments of the great body of the American people on economic questions, they are now ostensibly changing their position by claiming to have abandoned their old ground, and urging what they term in their revised phraseology "fair trade." This new variety of trade is explained by the erudite commercial lexicon of the Treasury Department as meaning free trade in some articles and protection in others. The articles proposed by this class of political economists for the free list on the fair-trade schedules are such as are the staples of foreign production, and compete directly and ruinously with American manufactures, to encourage and develop which the fostering care of the government has been extended. Those on the schedules for protection comprise a few articles which are of small importance and require no protection. To accomplish this these same parties are violent advocates of revenue reform, which is usually the entering wedge for a general upheaval and a disarrangement of prices and enterprise.

The fair traders, it appears, are trying to organize an influence throughout the country which they expect to bring to bear upon Senators and Representatives in Congress. The lesson of last year's campaign was a good one, but there are some who do not yet see the signs of the times in that verdict of the people. The M. C.'s who drop in here from time to time do not evince any hesitation or doubt as to their duty in the premises, and there is every evidence that the issue on the Speakership in the choice of the candidate will be largely influenced, if not determined, by his position on this question alone. Kasson's friends are still pressing their claims, and Hisecock, of New York, and his friends are making things lively among the New England and Middle States tariff Representatives. The protective side of the question is decidedly more popular than it was a year ago in the West. The people there, it appears, now begin to realize that protection applies to laborers as much as to manufacturers; that with free or fair trade the wages of labor must necessarily come down to the level of foreign prices, and with it the degradation and absolute servitude to which the foreign laboring classes have been brought. The people are beginning to discern the difference between what the free traders chose to advance as the effect of protection in Great Britain and American protection. In the former case everything was subservient to large exportation, and, as a consequence, labor was fixed at a minimum, and the interests of the laborer were only considered as representing so much physical force. Protection in the United States, as every one knows, is in the interest of home industry and labor, and gives the working classes a place in the social organization. The friends of American industry, it is reported here, are fully alive to the situation.

The proposed National Tariff Convention, to be held in New York on November 30, is attracting much attention here, as it is believed that its utterances will have more or less influence upon that subject in Congress. The first session of the Forty-seventh Congress will assemble here in five days after for organization, so far as the House of Representatives is concerned, and for such legislation as the necessities of the government and the welfare of the people demand. The coming session will in all probability not adjourn until June, and perhaps July. During this time there is little doubt that the free traders and other agitators will make their attempts to force some legislation on the tariff. The proposed convention is considered here as timely and of increased importance, and its objects, as stated, are generally accepted as covering the whole ground. This is especially so in the recommendation of some remedial legislation in the matter of Treasury and court decisions, which are frequently the instruments of overturning the law; also in the creation of a competent commission "to thoroughly investigate and report upon the progress, condition and needs of American industries, and to recommend such tariff legislation as will be protective in character and consistent in all its parts, and adapted to the present condition of the business of the country," and also the enlargement of the markets for American products by the extension of American shipping and foreign commerce.

Ex-Governor Hendricks' effusion on the protective tariff is considered here as the exposition of the Democratic doctrines on that subject. The Democratic Senators generally are rather surprised at the sweeping character of the Indiana statesman's propositions. They consider such an article as more calculated to injure than to benefit the Democratic party. They concede a radical change in public opinion on this subject, and do not believe in forcing an issue against public sentiment.

The port of New York is remarkably free from contagious diseases, there having been received at Quarantine thus far only about a score of sufferers from yellow fever, of whom two died. The present number of patients is sixteen. Last year, up to October 29, when the last death occurred, 80 cases were admitted, among whom there were 22 deaths.

Mr. G. J. Lewis, of Philadelphia, proposes to obtain white lead by heating the fumes of lead resulting from smelting processes, and then passing it into a cooling retort. Finely powdered sulphuret of lead (galena) is introduced into a funnel, whence it is forced by a bellows into the retort. This retort is heated to a red heat, which causes the sulphuret of lead to sublime and to deposit itself on the cooler surfaces. The

fumes of lead then pass into a cooling chamber, and finally into a reservoir where the product is collected. Another method of obtaining white lead is to introduce sheet lead into a chamber containing jars of acetic acid, the atmosphere being heated by steam to a temperature of from 30 to 50 degrees, besides being strongly impregnated with carbonic acid.

## Hallett's Antimony.

NEW YORK, Oct. 5, 1881.

To the Editor of The Iron Age.—DEAR SIR: The inclosed communication addressed to our Liverpool house, Messrs. Dickerson & Co., by Messrs. Hallett & Fry, makers of the well-known brand of "Hallett's" antimony, has just been received by us, and is hereby submitted to you for publication if you see fit. Yours respectfully,  
DICKERSON, VAN DUSEN & CO.

NORWAY WHEAT.

202 Rotherhithe, LONDON, S. E.

September 23, 1881.

Messrs. Dickerson & Co.—DEAR SIR: Having sent a circular recently issued by Ackerman & Co., of New York, in which it is stated that an analysis of our antimony gave only 91.16 of pure metal and 8.84 of impurities, we have had a cake of our make tested by Mr. F. Claudet, who reports that the same contained 99.46 pure antimony and only .54 per cent. impurities, proving the entire inaccuracy of the New York report. We may further add that the analysis just made only confirms those which have been made at intervals during many years, and proves that "Hallett's" brand is fully as pure as that of any other maker.

We are, yours faithfully,  
HALLETT & FRY.

## The Crops.

The wheat and corn crops for 1881 are given in a summary published by Bradstreet's. The outlook is not so forbidding as operators would like to have the public believe, nor is the situation one likely to greatly affect the finances of the country. The causes which have combined to shorten the crops were a severe winter, chinch bugs, and drought. The latter reached nearly every portion of the grain-growing sections. A recapitulation of the returns shows a total amount of yield of wheat in 1881 as follows:

	Bushels.
Western States	248,137,000
Pacific coast	33,125,000
Colorado and Territories	12,000,000
New England	1,000,000
Middle States	34,500,000
Southern States	40,000,000
Total	368,662,000

This is against 430,000,000 bushels in 1880, showing a loss of 111,038,000 bushels. Following is a summary of the yield of wheat in the Western States in bushels:

	1880.	1881.
Illinois	56,500,000	24,675,000
Indiana	48,400,000	20,750,000
Iowa	24,750,000	24,000,000
Nebraska	11,000,000	14,686,000
Michigan	33,375,000	18,640,000
Minnesota	41,500,000	33,170,000
Missouri	28,000,000	18,890,000
Ohio	48,500,000	35,815,000
Kentucky	9,000,000	8,087,000
Wisconsin	16,300,000	19,500,000
Kansas	19,300,000	19,949,000
Total	343,570,000	248,137,000

Returns of the corn crop are less favorable than those of wheat, but nevertheless will not be pleasantly regarded by the operators who have gambled upon a half crop. Summarized the corn crop of 1881 is as follows:

	Bushels.
Western States	869,241,000
Southern States	247,506,000
Middle States	69,400,000
New England States	7,800,000
Pacific coast	2,500,000
Territories	5,000,000
Total	1,193,647,000

The yield of corn in the Western States is shown by the following table:

	1880.	1881.
Ohio	119,040,000	74,250,000
Michigan	34,816,000	25,470,000
Indiana	99,220,000	75,950,000
Illinois	240,452,000	168,368,000
Wisconsin	33,767,000	37,290,000
Minnesota	154,776,000	172,000,000
Iowa	260,192,000	191,810,000
Missouri	160,463,000	125,240,000
Kansas	106,218,000	73,988,000
Nebraska	59,507,000	81,705,000
Total	1,130,033,000	869,241,000

The Southern States suffered largely from the drought, and the corn crop in Kentucky reaches only 40,500,600 in 1881, against 86,039,000 in 1880. Tennessee reports a shortage of 43 per cent.; Virginia and Texas 40 per cent., and nearly the same for West Virginia. Altogether the corn crop of the United States of 1881 is short about one-third of a usual yield.

The St. Louis Commercial Gazette says: Considerable interest has been aroused among dealers in metals especially, and the St. Louis public generally, by reason of the receipt on last Monday of a shipment of genuine Missouri copper from the furnace of the Ste. Genevieve Copper Company. The shipment comprised 436 ingots of copper (4921 pounds), and it is as pure as any copper that has been received in this market, assaying over 99 per cent. pure metal. The Ste. Genevieve refinery has been completed but a short time. It is under the management of Mr. Frank Nicholson, a graduate of Washington University. The product is thoroughly inspected and dressed, and is freed entirely from arsenic or antimony, and will rank in purity with the celebrated Lake copper. Col. O. D. Harris, the banker at Ste. Genevieve, is the president of the company. We shall watch with interest the results of this attempt to develop another field of enterprise in our State.

A visit of King Kalakaua to Mr. Edison's headquarters on Fifth avenue is thus noticed by the reporters: "Can you lay your wires in submarine cables?" Attorney-General Armstrong asked. "Well, it would cost so much, that's all," Edison said. "Because you might come over to the Sandwich Islands," the king's adviser said, "where we have a volcano that burns a thousand million tons of coal a day, and you could put your boilers on top of the volcano and get

power enough to supply this country." "Is that where you get your coal?" Edison asked, overlooking the joke in his thirst for information. "No; we get our coal from Australia," said the attorney-general, "but we build great hopes on that volcano. When we sell out we expect to get more for that than for anything we have got." At this the king laughed heartily. He went through the building with Edison and watched the inventor with unaffected curiosity. He was astonished to hear that the carbon horse-shoes gradually became so hard by burning that they will cut glass like a diamond. The king suggested that this information would be prized by the ladies.

## METALLURGICAL NOTES.

POWER CONSUMPTION IN ROLLING IRON AND STEEL.

At a recent meeting of the Pfalz-Saarbrücken section of the Ver. Deutscher Ingenieure, Herr F. Braune gave the results of some experiments made to ascertain the power required to roll certain bars of steel of maximum size and length, as compared with iron rods of the same dimensions. The train consisted of two sets of three-high rolls, having an average diameter of 21.66 inches. The engine had a 35.43-inch stroke, and ordinarily worked at 80 revolutions. The usual pressure was 57 pounds in the steam pipe, but the valve gear was not in particularly good condition. The fly-wheel was 26 feet in diameter and it weighed 33 tons. When iron was being rolled, the engine moved with an expansion of five-eighths at ordinary steam pressure, the expansion being regulated by hand. A pile of iron was rolled in one heat in 130 passes, the engine developing 260 indicated horse-power. After the bar had gone through the finishing pass the engine was running at usual speed, so that a new pile could at once be rolled. The engine was, therefore, sufficient, under ordinary circumstances, for current manufacture of iron bars.

It was well understood in the outset that it would be too weak for steel, circumstances remaining the same. Therefore, before commencing to roll steel, the other trains in the mill were stopped, although the heating furnaces were kept going, so that the boilers attached to them made steam of 71 pounds pressure. The engine was run up to a speed of 79 revolutions per minute before the ingot entered the rolls, and an indicator diagram was taken. The steel passed through the rolls while the engine had made 145 revolutions. It was, therefore, found possible to put through steel by using a higher pressure of steam and a higher initial speed, but it would not do for current manufacture, because the speed had been so much decreased that a second billet, if put in at once, would probably have stuck fast after a few passes. It would be necessary, therefore, to add the number of roller turns which it would take, with the same expansion and the same pressure of steam, until the engine had again recovered its regular speed of 90 revolutions. For this 40 revolutions were required. Two sets of diagrams were taken during the rolling. The product of the distance traveled by the piston,  $s$ , taken from the time the billet entered the rolls until the engine had recovered its ordinary speed, and the average pressure,  $p$ , on the piston surface, as obtained from the diagrams and the diameter of the engine cylinder, would yield the power required for rolling the rod. It would be, therefore:

$$s = 2 + 185 = 1091.5 \text{ ft.}$$

$$p = 27,778 \text{ lb.}$$

$$s + p = 30,325,900 \text{ foot-pounds.}$$

It should be remarked, however, that the steel billets were not quite hot enough for satisfactory rolling; that the first roughing grooves, though well adapted for iron, were not favorable to steel, which can stand a greater pressure. The determination of the number of revolutions required until the engine recovered was inaccurate, and the steel was rolled too slowly. But if it is considered that it is never well to take the power for a train of rolls too low, these experiments, incomplete as they were, may nevertheless serve as a basis for the estimation of the power of the engine for steel. If the piston speed for iron be called  $s$ ; that for steel,  $s'$ ;  $p$  the average pressure on the piston for iron, and  $p'$  for steel;  $w$  the average velocity of the circumference of the rolls of an iron train, and  $w'$  for steel, the following formula will be obtained:

$$P \times s' \times w' = P \times s.$$

In the special case examined by Herr Braune, the parts of the engine and the shaft of the fly-wheel permitted an increase in the diameter of the cylinder of the engine to 39.37 inches, which, together with an increase of the pressure of steam by 7 pounds and a diameter of the rolls to 27.56 inches, would make it possible to roll steel. The power of the engine will be 730 indicated horse-power,  $s'$  that, taking into account an increase in the speed of the rolls in the proportion of 14 to 11, the power will be from 2.8 to 3 greater for steel than for iron. The engine will have a 30.37-inch cylinder expanded at one-half of the stroke and work with a pressure of 72 pounds per square inch. Herr Braune states that his experience has taught him that the dimensions used for many steel-mill engines are too large, and that the reason why sometimes these large engines fail to do their duty is that their valve gear is deficient. He speaks highly of a new rail-mill engine with Corlies gear, built for Krupp by Van der Kerchove, of Ghent. It has a 36-inch cylinder, 5-foot stroke and marks 75 revolutions per minute. The fly-wheel weighs 50 tons, its diameter being 24.5 feet. It is non-condensing, and, working at a pressure of 64 pounds and expanding one-half, develops 800 horse-power.

DETERMINATION OF CHROMIUM IN CHROME IRON ORE.

Messrs. H. N. Morse and W. C. Day have accomplished the determination of chromium in chrome iron ore, by fusing the material with potassium hydroxide in a wrought-iron crucible, their method having yielded, without exception, satisfactory results. From 6 to 10 grams of potassium hydroxide are placed in the crucible (the latter having a capacity of about 100 c. c.) and

gently heated until the evolution of steam ceases. After cooling, the finely powdered material, weighing about 5 grams, is evenly spread over the fused mass, and a flame just sufficient to fuse the alkali is applied to the uncovered crucible; the contents, while fluid, being stirred with a piece of iron wire, which is allowed to remain in the crucible. As the decomposition progresses, the potassium hydroxide, together with the soluble products of the decomposition, rises upon the sides of the crucible, where it is deposited. After the decomposition is complete, the crucible is turned upon its side, its under surface being raised to a dull red heat, which converts the chromium into oxide, as is shown by the resulting yellow color. A greenish color is noticed in portions of the incrustation, being due to the presence of iron or manganese. After complete oxidation and cooling, the incrustation is dissolved in hot water and is boiled in order to effect the complete precipitation of the iron. After filtering, the liquid, which now has a yellow color, is acidified with nitric acid, the aluminum being precipitated with ammonia and washed by decantation. The potassium chromate is then reduced, and the silica rendered insoluble by evaporation with hydrochloric acid. It now simply remains to separate the chromium from magnesium and determine it as oxide. The only other method involving the use of potassium hydroxide is that proposed by H. Schwartz, the fusion being effected in a silver crucible, potassium chlorate being added to the fused mass. The rapidity, however, with which the crucible is destroyed, renders this method both costly and impracticable.

A dispatch from London says it was demonstrated by actual performance that the engines of the new steamer City of Rome could be brought to a dead stop in two seconds by turning a single lever, and that from going at full speed ahead could be reversed to full speed astern in the space of five seconds.

Canadians are becoming solicitous respecting the new Franco-Brazilian line of steamships that it receive substantial encouragement in the British provinces. The first steamer has sailed from France for Brazil, and is expected to reach Halifax toward the end of October.

The *Economiste Français* gives the following figures as the cost and selling price of coal in 1879, in the most prominent of the French and Belgian coal districts: Pas de Calais, cost, 10.73 fr.; selling price, 12.30 fr.; Department of the North, cost, 10.50 fr.; selling price, 11.36 fr.; Hamault, cost, 6.43 fr.; Selling price, 9.54 fr.

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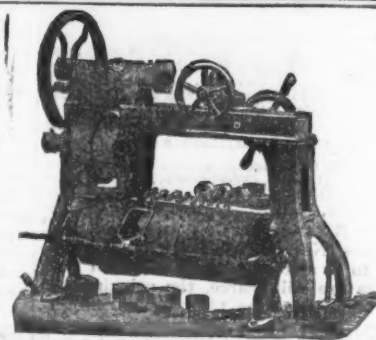
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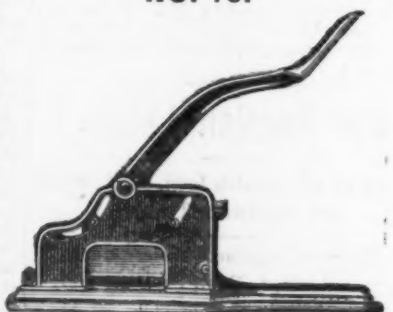


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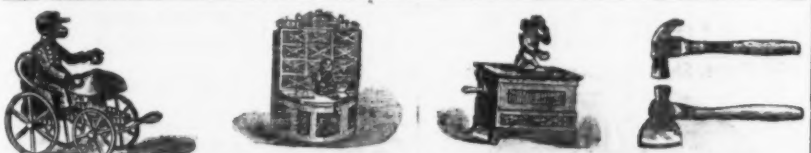
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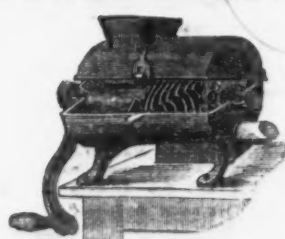
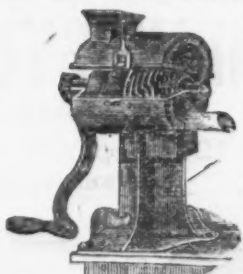


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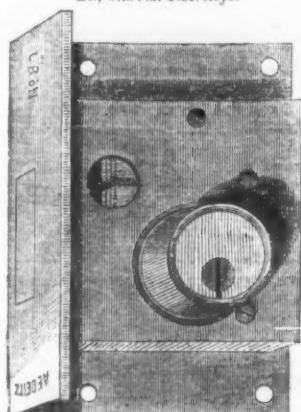
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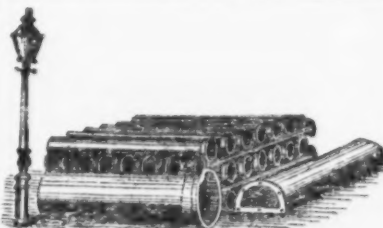
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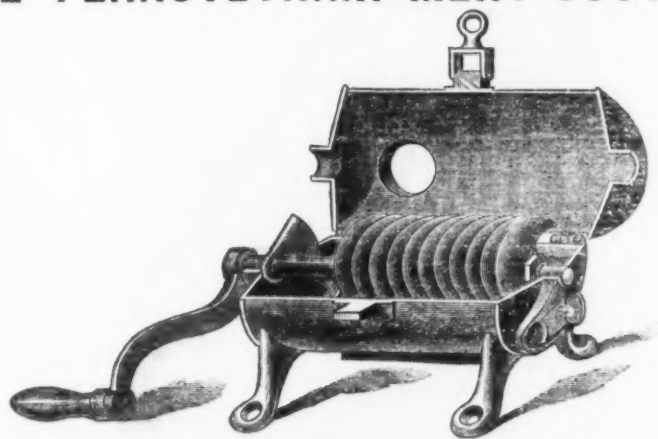
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## Ice Cream Freezers.

Torrey's Door Springs.

**S. ROEBUCK & CO.,** Manufacturers,  
164 Fulton St., New York.



**Beardsley Scythe Co.,**  
Manufacturers of  
GRASS, GRAIN & BUSH SCYTHES,  
Hay Knives & Corn Knives.  
West Winsted, Conn.

See our advertisement in *The Iron Age* first issue of each month.

## The Iron-Masters' LABORATORY.

Exclusively for the

Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.

No. 339 Walnut St., Philadelphia.  
With Branch at Warrenton, Virginia.

**J. BLODGET BRITTON.**

This laboratory was established in 1856, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

### CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an ordinary Ore..... \$4.00  
For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12.50  
For each additional constituent of usual occurrence..... 1.50  
For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.  
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For each additional constituent of usual occurrence..... 6.00  
For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10.00  
or each additional constituent..... 2.00  
or the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12.50  
For determining the constituents of a Clay, Slag, Coke, or of an Ash in Coal the charges will correspond with those for the constituents of an ore.  
For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.  
Printed instructions for obtaining proper average samples for analysis furnished upon application.

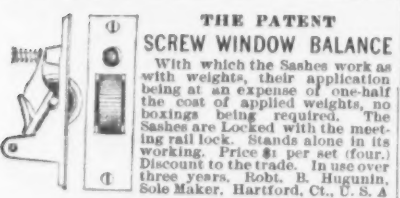
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Manufacturers of

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TURKEY WING GRAIN CRADLES,  
4, 5 and 6 fingers.  
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4 fingers.  
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All of a superior quality.  
None genuine unless marked  
Grant Fan Mill and Cradle Co.  
Send for illustrated catalogue  
and price list.  
P. O. Address,  
MELROSE Rensselaer Co. N. Y.



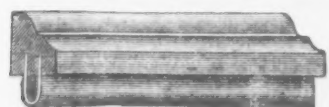
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With which the Sashes work as with weights, their application being at an expense of one-half the cost of applied weights, no boxes being required. The Sashes are Locked with the meeting rail lock. Stands alone in its working. Price \$1.00 per set (four). Discount to the trade. In use over three years. Robt. B. Huguenin, Sole Maker, Hartford, Ct., U. S. A.

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For Sale by all Hardware Dealers.



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This cut represents the interior of the Tuyere, showing the rotating air tubes through which four different sized currents of air may be passed, thereby making any sized fire from two to 18 inches in diameter; for instance, if a large fire is being used and the next job should be a nail rod, we do not move or burn the large bed of coal,



but turn the small tube up and so concentrate the heat to the point desired.

The constant flow of water keeps the Tuyere cool and prevents cinders or clinkers from forming in the fire. To prevent the water from freezing in the pipes, the barrel is supplied with a faucet that empties the pipes but not the barrel. All the dirt from the fire sifts through the perforated fire cap into the dirt box, from which it is blown by the blast when the ball valve is raised for that purpose. I also furnish Tuyere Irons without water attachment. See first issue of the month.

After having used your "Variable Blast Tuyere Iron" three months, I pronounce it perfect in every respect, and it actually saves from 25 to 50 per cent. of the coal. CHAS. VAN HORN, Earlville, Ill.

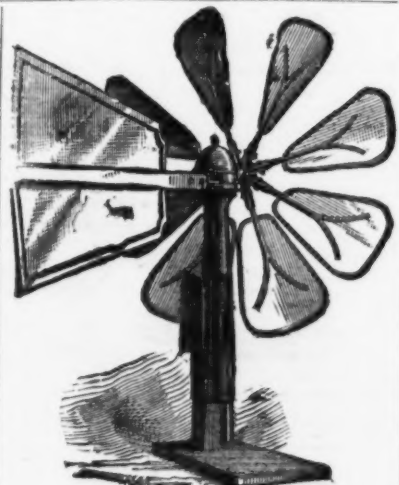
Send for price list and discount.  
A. W. MORGAN, Patentee and Manufacturer,  
Office, 52 Vance Block, Indianapolis.

**WITHEROW & GORDON,**  
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## WHITWELL HOT BLAST STOVES.

OVER 600 IN USE.

The following parties either have them in use or under construction:  
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Chester Rolling Mill Co., Pa.  
Davenport, Fairbairn & Co., Pa.  
Isabella Furnace Co., Pa.  
Faxon Furnace, Pa.  
Spearman Iron Co., Pa.  
Cina Iron Works, Ohio.  
Milton Coal and Iron Co., Ohio.  
Winona Furnace Co., Ohio.  
Wong & Marshall, Ohio.  
H. Campbell & Sons, Ohio.  
Hocking Valley Iron Co., Ohio.  
Cleveland Rolling Mill Co., Ohio.  
Meier Iron Co., Ill.  
North Chicago Steel Co., Ill.  
Union Iron and Steel Co., Ill.  
Means & Culbertson, Ky.  
Ashland Furnace Co., Ky.  
Norton Iron Co., Ky.  
Southern States C. I. and S. Co., Tenn.  
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Water Driven to any Height and Distance by Compressed Air.  
Country Houses Supplied Cheaply and Certainly for Bath Rooms, Water Closets, Hot and Cold Water Faucets, &c. Plenty of Fresh Water for Stock on Farms. The best Pump for Irrigating, supplying Railroad tanks, and for Mining purposes. For Circular and Price list address, **EZRA BROOKS, Sec'y and General Manager of The Hartford Compressed Air Pump Co., Hartford, Conn., U. S. A.**

## THE LOWE PATENT FEED WATER HEATER & PURIFIER.

FOR  
Heating and Purifying Water for Steam Boilers.  
Patented July 12, 1877.  
Has Straight Tubes.  
SIMPLICITY,  
RELIABILITY and  
EFFICIENCY  
At Less Cost  
Than any Other.  
Write for prices and further information to the manufacturers,  
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Window Springs**  
Lock and support upper and lower sashes—all sizes. Are very convenient, simple and durable. Sample to the Trade free.  
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Lewisberry, York Co., Pa.  
Circulars give full instructions.

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Combines every advantage possible in an ICE CREEPER. Attaches with a thumb screw; turns over into instant; one size for all.  
R. P. SCOTT & CO.,  
Manufacturers, NEWARK, N.J.

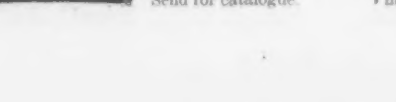


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REFRIGERATOR.**  
With Water, Wine and Milk Cooler. Best Food and Ice Preserver in the world. Send for Book. A. M. LESLEY, 360 Sixth Avenue, Also the Rotunda Furniture Co., CLEVELAND, O.



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Unsurpassed for cheapness and durability. Unlike any other make, it combines a perfect lever principle with a blade working in a slotted steel hook.  
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**HOOSIER SAW WORKS**  
W. B. BARRY, Indianapolis, Ind.  
CIRCULAR SAWS.  
I use none but best refined cast steel, selected. All saws subjected to a careful examination before shipment. A trial of our goods will satisfy the purchaser of their excellence.  
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## "Climax" BARREL TANK ATTACHMENTS.



## "Climax"

Is designed to be attached to any Barrel or Cask, thereby converting the same into a temporary Tank, fitted with an effective Pump, and while protecting contents from dirt and waste, the owner has entire control of same, by simply locking the cover. It entirely does away with the labor and waste attendant upon emptying Barrels into any of the numerous Metal Tanks, while securing all the conveniences of the same, at a GREATLY REDUCED COST. The Apparatus can be adjusted in a few moments to a Barrel of any size, and as quickly shifted to another when contents are exhausted, the process of connecting being very simple. It is as compact in form as is consistent with perfect efficiency, and we feel confident that a trial will demonstrate its practical value.

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Who buys in bulk any of the various kinds of Oils, or in fact any Fluid that can be Pumped;

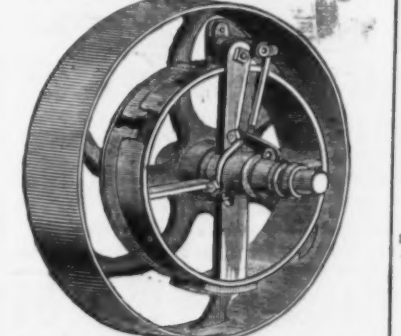
Every Mill, Factory, or Work-Shop, where Oils or other fluids are used, and every store where such fluids are retailed, will find the "CLIMAX" just what they require.

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For Gears, Shaft Couplings or Pulleys.



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Genuine Old Reliable,  
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Stones made, labeled and branded in any style desired. PRICE and QUALITY GUARANTEED. All the above brands are of clear, hard grit and will not glaze.



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SQUEEZER,**

With Perforated Strainer.

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**Dinner Pail and  
Lantern.**  
The most perfect Dinner Pail in the world. Hot coffee for dinner and a Lantern at sight.  
Manufactured by J. S. HAIGHT,  
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Sent by express on receipt of \$1.00. Agents wanted.

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**Pat. Swing Socket Snaths**  
and also a large variety of other styles of Snaths  
**Springfield, Vermont.**  
Represented in New York by Lamson & Goodnow Mfg. Co.



## HUBBELL'S PATENT METAL CORNERS

FOR OIL CLOTH,  
With Binding to Match.

Protect them from wearing and are ornamental. These goods need only be seen by the public; the real merits are at once appreciated. Sample orders solicited and circulars sent on application.  
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## Grindstones, Emery St.

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Berea, O., Nova Scotia, & other brands

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Of all description.

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## OHIO GRINDSTONE COMPANY, Manufacturers of

## GRINDSTONES

Of All Kinds.

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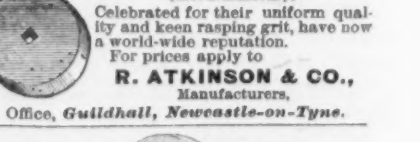
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Celebrated for their uniform quality and keen rasping grit, have now a world-wide reputation.

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**P. L. Cole,** Constitution, Ohio, will be supplied to the Southern trade at lowest possible rates by

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Large stock on hand, especially suited to Saw and Shovel Manufacturers, at bottom prices.

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Send for quotations and samples.



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## Sheet Brass, Cast Brass, Brass Kettles, Machine Oilers, Lanterns,

KEROSENE LAMPS AND TRIMMINGS, TINMEN'S TRIMMINGS, &c.

Warehouse, - - 35 Warren Street, - - NEW YORK.

### AKRON IRON COMPANY,

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Sole Manufacturers of

## Patent Hot Polished Shafting.

Medal of Superiority awarded at American Institute Fair of 1880.

This Shafting is superior to any in the market, and commends itself to the trade for the following reasons, viz:

- 1st. It is perfectly straight and round.
- 2d. It can be finished accurately to any desired gauge.
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- 5th. Its surface is composed of magnetic oxide of iron, and consequently presents a journal or bearing surface that is unexcelled.

6th. The peculiarity of its manufacture is such as to entail loss in making it, if other than superior stock is used. Those purchasing it may therefore be assured of receiving first-class material.

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Where parties desire it we cut keyways or splines any length required, at a moderate charge.

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BRONZED IRON AND BRONZE METAL DOOR TRIMMINGS, BUTTS AND HARDWARE.

CAST BUTTS, DOOR BOLTS, WELL WHEELS, FLUSH BOLTS, SHUTTER BOLTS, PAD LOCKS, BARN DOOR HANGERS, & RAIL, GRINDSTONE FIXTURES, SCREW & SIDE PULLEYS, NOISELESS PULLEYS, HAY FORK PULLEYS, SHELF BRACKETS,

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Having largely increased our facilities and line of goods, we invite the attention of the Trade.

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## Wrought Iron Butts, Hinges

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Plain, Japanned, Bronzed and Plated.

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**BRASS PAD LOCKS**

For Railroad Switches, Freight Cars, and the Hardware Trade. All sizes, with Brass and Steel Keys, with and without chains.

Patent Horizontal Rim Cylinder Night Latch.

Self-adjusting to doors of any thickness, with Patent Stop and Drawer Back Knob.

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Catalogues and Samples sent on application.

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**PATENT COMBINATION WRENCH.**

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

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Laflin & Rand Powder Co.

No. 29 Murray Street, New York, Manufacture and sell the following celebrated brands of sporting powder known everywhere as

**ORANGE LIGHTNING, ORANGE DUCKING, ORANGE RIFLE**

more popular than any Powder now in use. **Blasting Powder and Electrical Blasting Apparatus.**

**Military Powder** on hand and made to order. **SAFETY FUSE, FRICTIONAL & PLATINUM FUSES.**

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Patented May 31, 1870.

A fibrous material, encasing about 90 per cent. of its volume of air, and therefore a superior

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Being made from the slag of blast furnaces, it is fire-proof and durable in contact with heated surfaces. Readily applied.

Heaviest grade about 25 lbs. per cubic foot. Price, 1 cent per lb.

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An Improved Pattern.

Cheap and Durable.

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Sprout's Double and Single Shear

**Horse Hay Forks**

And Sprout's

**HAY ELEVATORS, PULLEYS AND GRAPPLERS.**

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**WM. ESTERBROOK,**

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### CORRUGATED AND CRIMPED IRON

ROOFING & SIDING,

Iron Buildings, Roofs

Shutters, Doors, Cornices

Skylights, Bridges, &c.

**MOSELEY IRON BRIDGE AND ROOF CO.,**

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FOR SALE,

At New England Machinery Depot,

308 North Third St., Philadelphia, Pa.

Horizontal, Vertical and Locomotive Tubular

Boiler, from 3 to 60 H. P., in stock and larger to

order. Engines all sizes. Pumps, Heaters, Injectors,

steam and hand Brick and Mortar Hoists.

Boiler Test Pumps. The new Gravity Coffee

Roaster. All of the above constantly kept in stock.

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### STOVE REPAIRS.

Repairs for Stoves made at Troy, Albany, Rochester, Cleveland, Buffalo, Boston, St. Louis, Quincy, Chicago, Milwaukee and elsewhere, at

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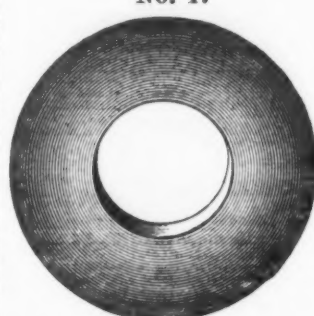
## Providence Tool Co.,

PROVIDENCE, R. I.

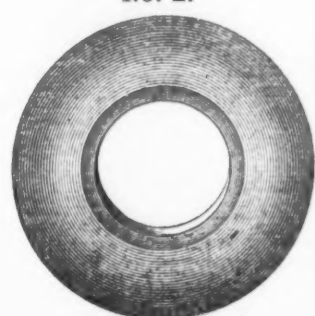
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No. 1.

No. 2.



Straight Hole.



Countersunk Hole.

Prices on Application.

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163 & 165 Lake St.,

NEW YORK AGENT.

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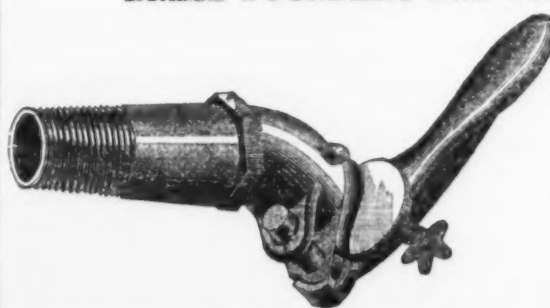
THE GENUINE STEBBINS

## MOLASSES & OIL GATES,

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BRASS FOUNDERS AND FINISHERS.



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COMPRESSION

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Office of **NELSON LYON,**  
SOLE MANUFACTURER OF  
**Lyon's Patent Metallic Heel Stiffeners,**  
Also, Manufacturer of  
**BRUSHES**  
Of Every Description,  
Nos. 17 & 19 Green St.,  
Albany, N. Y., Dec. 8, 1880.

**FOR 1/4 INCH HEEL.**

To All Whom it May Concern:

To-day a decree in my suit against G. T. Fisher & Co., of Detroit, for an infringement of my patent, was made and entered, of which the following is an extract:

At a session of the Circuit Court of the United States for the Eastern District of Michigan, held at Detroit, &c., on Wednesday, the 8th day of December, 1880.

**NELSON LYON** against **GUYON T. FISHER, et al.**

It is ordered, adjudged and decreed, that the act entitled "An act for the relief of Nelson Lyon and Jeremiah S. James," passed by Congress and approved April 1, 1880, &c., is a good, valid and constitutional act.

That the original patent, bearing date July 9, 1872, and numbered 128,242, granted and issued to Joseph Baraloux, Jeremiah S. James and Nelson Lyon, when corrected by the Acting Commissioner of Patents, as directed by said act, was a good and valid patent.

That the said Joseph Baraloux was the original and first inventor of the improvements in metallic stiffeners for boots and shoe heels mentioned and described in said letters patent.

That the said Nelson Lyon received of said Joseph Baraloux, as aforesaid, is a good and valid patent; that said Lyon is exclusively possessed of said Letters Patent and the invention therein secured.

That the defendants, G. T. Fisher & Co., and each of them, have infringed upon the said patents and upon the exclusive rights of said Lyon under the same.

That said Lyon receive of said defendants all the profits, &c., they have made, and in addition thereto all the damage he has suffered by reason of the infringements by the defendants, and also the costs, charges and disbursements in the action.

It is also further ordered, adjudged and decreed, that a perpetual injunction be issued against said defendants, according to the prayer of the said complainant's bill.

You are also hereby notified that the perpetual injunction has been issued and served on the defendants.

All questions as to damages and settlements in relation to infringements under my patents must be addressed to and made with my attorney, WILLIAM H. KING, in my care at the above address.

**NELSON LYON.**

### SABIN MFG. CO.,

MONTPELIER, VT., MANUFACTURERS OF

DOUBLE-ACTING SPRING BUTTS,

SABIN'S LEVER DOOR SPRINGS, For heavy doors,

BOSS AND CROWN SPRINGS, For light doors.

Send for Catalogue. Represented in New York by **DAVID HYMES & CO., 99 Church St.**

## RIVETS

**C. F. HARRISON,**  
BOILER, BRIDGE & TANK  
CUTAHOGA FALLS, OHIO.

## RIVETS



Convex Reflector, Small, \$6.25; Med., \$7.50; Large, \$12.00, dis 10 %  
Lawna Moving Van, Philadelphia and Excelsior, new  
Pennsylvania, Philadelphia and Excelsior, new  
List..... dis 30 %  
**Lemon Squeezers.**  
Porcelain Sined..... \$ dos \$6.00—dis 30 %  
Waxed..... \$ dos \$6.00—dis 30 %  
Eureka, Tinned..... \$ dos \$6.00—dis 30 %  
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Jeannings' Patent..... \$ dos \$6.00—dis 35 %  
Linen..... \$ dos \$6.00—dis 35 %  
Linen..... \$ dos \$6.00—dis 35 %  
Cotton Chalk..... \$ dos \$6.00—dis 35 %  
Silk, Lake Chalk..... Nos. 0, 1, 2, 3 \$ dos \$6.00, \$6.50, \$7.00,  
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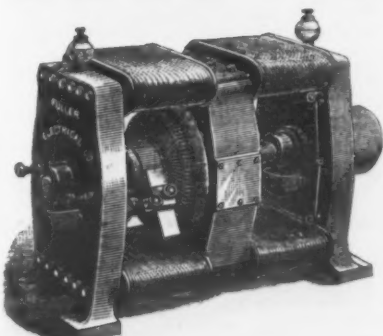
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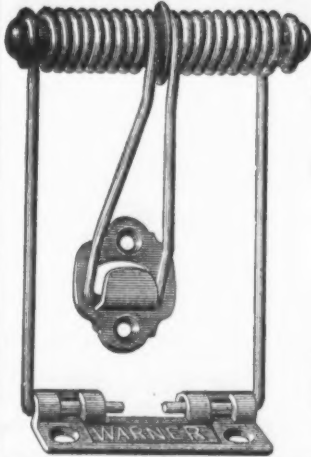
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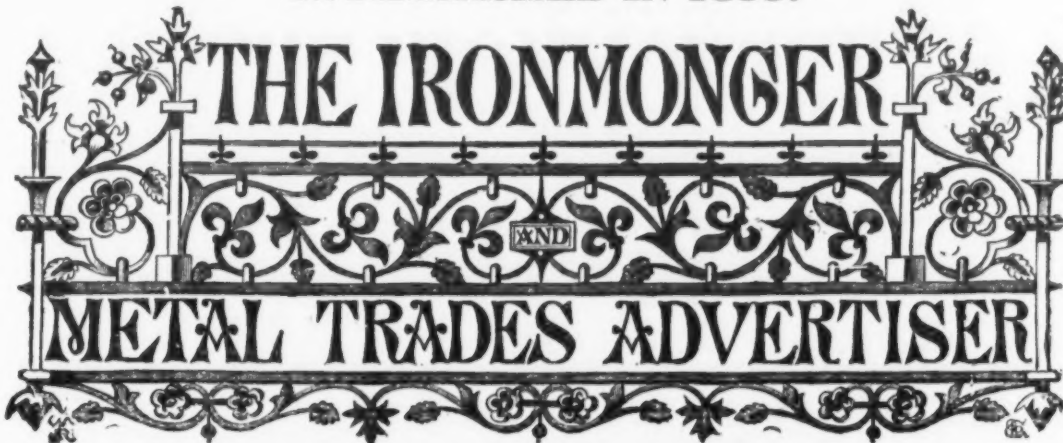
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**CINCINNATI OFFICE:** Builders' Exchange—T. T. MOORE,  
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**SOUTHERN OFFICE:** Cor. Eighth and Market Streets, Chattanooga, Tenn.—S. B. LOWE, Manager.

### SPECIAL FEATURES.

**Notes of Novelties.**—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to  
week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

**Special Correspondents.**—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British  
and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities  
for acquiring information specially suited for the columns of the *Ironmonger*. *The Week*, *Legal News*, *Trade Notes*, *Handicrafts*, *Foreign  
Notes*, *Colonial Jottings*, *Merchants' Circulars*, &c., are other departments of the journal, containing a digest of all matters of direct interest  
to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French  
Belgian and other Special Correspondence.

### SUBSCRIPTIONS

to the *Ironmonger and Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from an  
date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain.  
To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-  
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It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to  
year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of excep-  
tional value for advertisements. Sold to non-subscribers at 75 cents.

## THE FOREIGN SUPPLEMENT,

With which is incorporated *The Universal Engineer*,

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the  
next twelve months will be as follows:  
NOVEMBER 6, DECEMBER 3 and 31, 1881, JANUARY 28, FEBRUARY 25, MARCH 25, APRIL 22, MAY 20, JUNE 17, JULY 8, AUGUST 5, and  
SEPTEMBER 2 and 30, 1882

This Supplement is published in

### FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach  
out in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish  
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Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated is described in one language can  
be suitably described in four or more languages on the opposite or right page without illustrating.

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so far as experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertise-  
ment inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity not to be compared with any of the  
other ordinary channels of communication.



## B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.  
Established 1845.  
Office, foot of Houston Street, East River,  
NEW YORK.

## NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

## FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.  
For Glass and Steel Works.

## SILICA,

Bricks and Cement,  
English Fire Bricks.  
RIMINGTON BROS. & CO.,  
Newcastle-on-Tyne.  
Agent on this side

S. A. RIMINGTON,  
264 & 266 Water Street,  
NEW YORK.

M. D. Valentine & Bro  
Manufacturers of

## FIRE BRICK

And Furnace Blocks  
DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

## BORGNER & O'BRIEN,

Manufacturers

## FIRE BRICK

Edge Pressed Furnace Blocks,  
CLAY RETORTS, TILES, &c.,  
Twenty-third Street,  
PHILADELPHIA.  
Above Race,  
Twenty years' practical Experience.

## WATSON FIRE BRICK CO.,

ESTABLISHED 1836.

Successors to JOHN R. WATSON, Perth Amboy, New Jersey.  
Manufacturers of

## FIRE BRICK,

FOR ROLLING MILLS, BLAST FURNACES, FOUN-  
DRY GAS WORKS, LIME KILNS, TANNERIES,  
BOILER AND GRATE SETTING, GLASS WORKS, &c.  
Fire Clays, Fire Sand, and Kaolin for Sale.

## HENRY MAURER,

Proprietor of the

Excelsior Fire Brick & Clay  
Retort Works,  
Manufacturer of FIRE BRICK, HOLLOW  
BRICK AND CLAY RETORTS.

WORKS: PERTH AMBOY, NEW JERSEY.  
Office & Depot, 418 to 422 East 23d St., N. Y.

## TROY FIRE BRICK WORKS,

Troy, N. Y.,

## JAMES OSTRANDER & SON,

ESTABLISHED 1848.

Manufacturers of

## FIRE BRICK,

Taylors, Tiles, Blast Furnace Blocks, &c. Miners and  
Dealers in Woodbridge Fire Clay and Sand, and Staten  
Island Kaolin.

Established 1864.

## GARDNER BROTHERS,

Manufacturers of

STANDARD SAVAGE FIRE BRICK,  
TILE & FURNACE BLOCKS,  
OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and  
Miners and Shippers of Fire Clay.

Office: 116 Smithfield St., Pittsburgh, Pa.  
Works: Mt. Savage Junction, Md., and Lockport, Pa.

## HALL & SONS,

## FIRE BRICK,

Buffalo, N. Y.

## CHAS. D. COLSON,

## FIRE BRICK,

Foundry Facings, Sand, Tools and Supplies.

CHICAGO, ILL.

## UNION MINING COMPANY.

Mount Savage Fire Brick.

EDWARD J. ETTING, Agent,  
No. 280 South Third St., Philadelphia, Pa.

## THOMAS MORTON,

Manufacturer of

CABLE, COPPER, IRON AND STEEL SASH CHAINS,  
for suspending window sashes. Also, Copper Cham-  
pion Chains, with patent attachments, for same pur-  
pose. Agents wanted in the principal cities in the  
United States. Apply at  
20 Elizabeth Street, New York.

# HENRY DISSTON & SONS,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA.

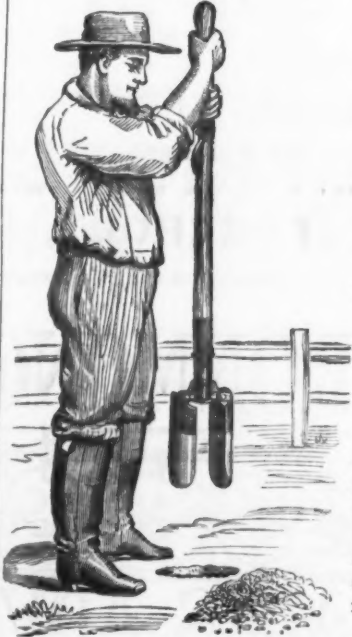
## DISSTON'S SAMSON TREE PLANTER AND POST HOLE DIGGER.

Fig. 1.

Patented May 29, 1870.

Price, - - - \$37.50 per dozen.

Fig. 2.



No Farmer, Nurseryman, Railroad  
or Telegraph Company  
SHOULD BE WITHOUT ONE.

NO BACK-ACHE.

NO KNEE-WORK.

NO CLOGGING.

This tool has been thoroughly tested, and has given  
the greatest satisfaction to all who have tried it. The  
principle on which it works makes it self-cleaning and  
prevents adhesion in sticky soil; therefore it always  
works free and easy. It is far superior to all plungers,  
augers and boring machines, as it works well in stony,  
sandy, or clay soils; quicksand under water is as easily  
removed as though no water existed.

### DIRECTIONS.

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as shown  
in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with one  
hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by simply  
pressing down the lever, which will open the blades and the dirt will fall from between them. The Digger is then ready for another  
plunge. The steel blades are nine inches long, and the whole tool five feet long. For sale at Hardware and Agricultural Stores.

## HENRY DISSTON & SONS.

### STANDARD SHAFT COUPLING SPRING.

Patented.  
Chicago, Ill.,  
July 24, '80.

Gentlemen:  
You may enter  
our order for  
500 sets of your  
Standard Shaft  
Coupling Springs  
(60 sets a month).  
A. A. ABBOTT  
& CO.

Side View.  
One dozen pairs, japanned  
expressed to the railroad  
for \$1.50 (per gross,  
\$18.00). Also, 5 per cent.  
off 30 days, 10 off spot cash.  
Discount to jobbers. Splin  
did selling art cle for com-  
mercial travelers. Nickel  
plated springs \$1 per doz.  
pairs. Dealers and the  
trade also supplied by the  
E. D. Clapp Mfg. Co., Au-  
bama, N. Y., and Wilcox &  
Mfg. Co., Birmingham, Conn.;  
Crandall, Stone & Co.,  
Mfg. Co., Carriage Trimming,  
Binghamton, N. Y.  
Perfect Anti-Rustler and Shift  
Belt Locker, and too a  
nest on a buggy. Sold by all  
hardware dealers every-  
where. Orders, large or small,  
filled promptly.

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Manufacturers for U. S. & Canada, under Letters  
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## CAST IRON Furnace Lamps

Gentlemen.—This cut illustrates our  
CAST IRON  
Furnace Lamps  
which are superceding entirely the Tin Lamps  
wherever introduced, in consequence of their dur-  
ability. They are now extensively used in the  
Iron Districts of Ohio and some in Pennsylvania.  
We call your attention to and solicit your order  
for them, confidently asserting that they are an  
A No. 1 article in every respect.

Sample sent if desired.  
PRICE, \$12 PER DOZEN.

Taylor & Boggis,  
CLEVELAND, O.

## ROCKING BLOCK GRATE,

Williams' Patent,

## J. Q. MAYNARD,

General Agent.

97 Liberty Street, NEW YORK.

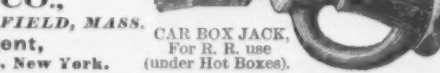
Fire level. Accumulation of cinders impossible.  
No cleaning out of fires during the day. Parts  
easily and cheaply replaced. Seventy per cent.  
of air space. Thirty days' trial.  
Send for circular.



## JACK SCREWS,

Press Screws, &c.,  
Cast with Perfect Seamless Thread by our new patent process.  
Cheaper than Wrought Iron, not so apt to bend or strip the  
thread. Liberal discount to the trade.

SEEGER MFG. CO.,  
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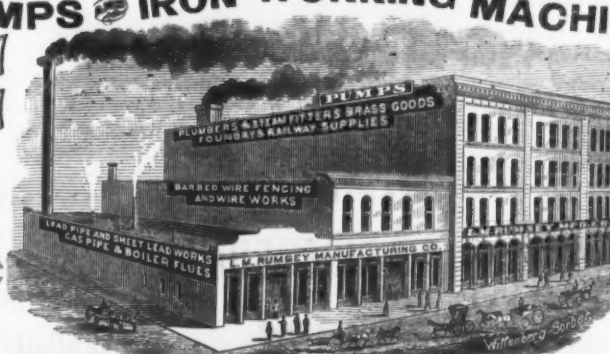
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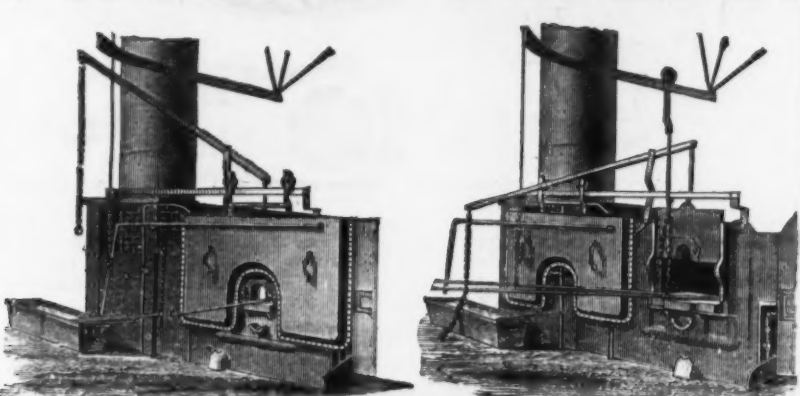
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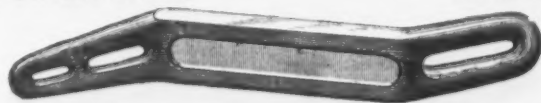
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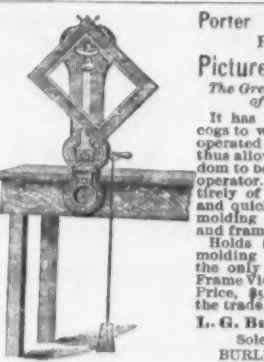
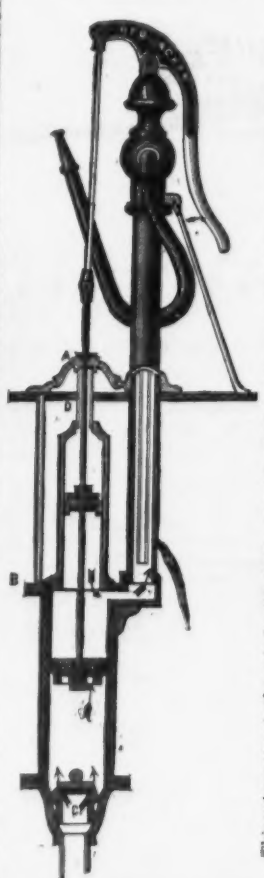
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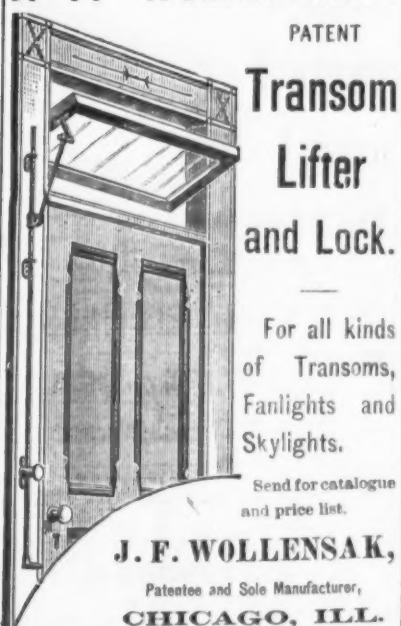
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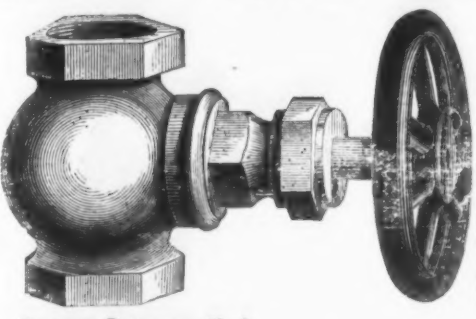
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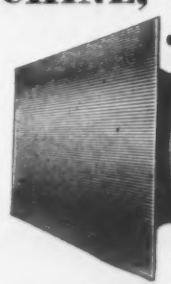
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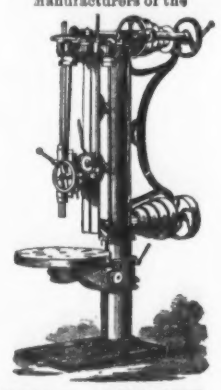
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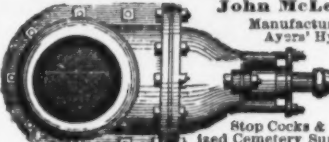
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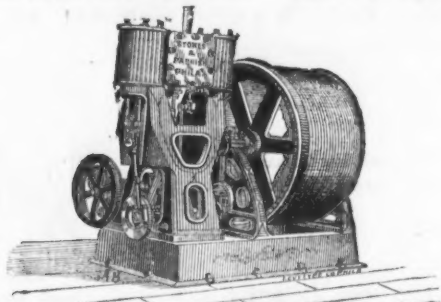


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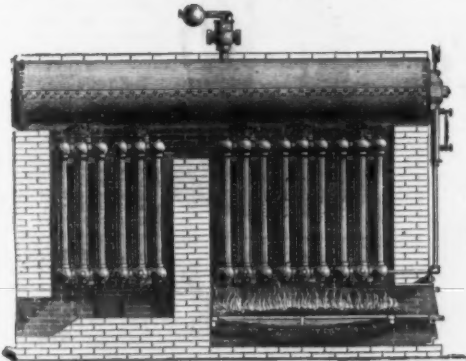
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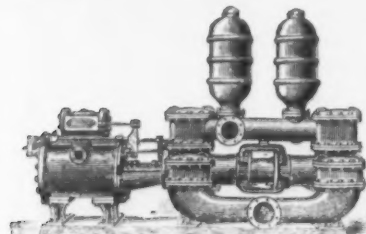
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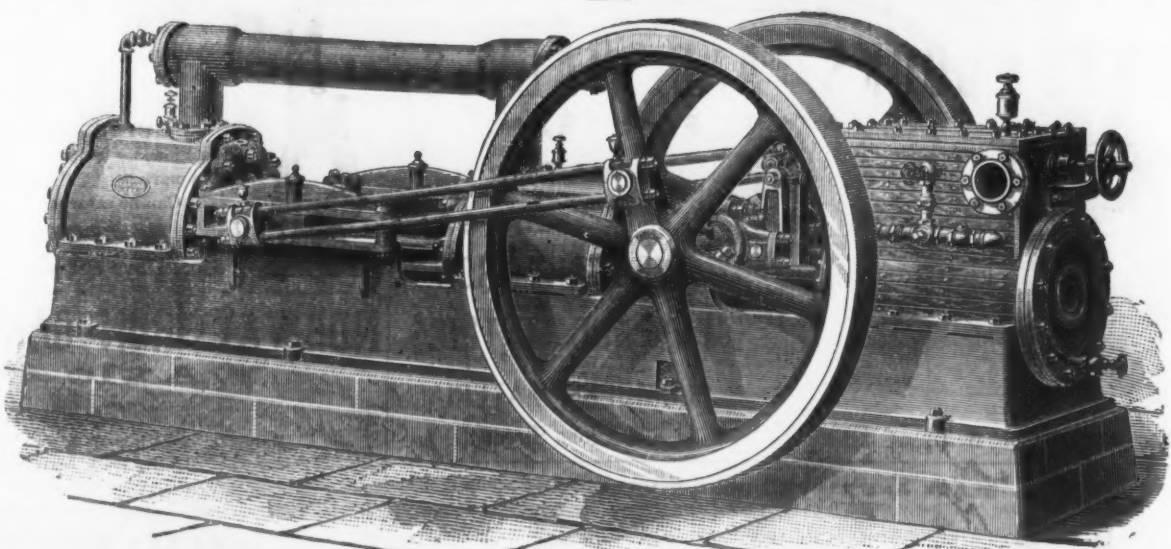
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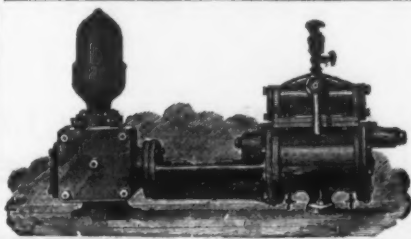
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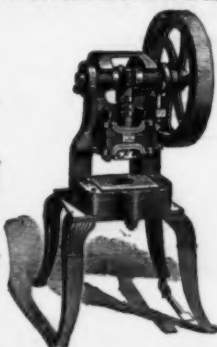
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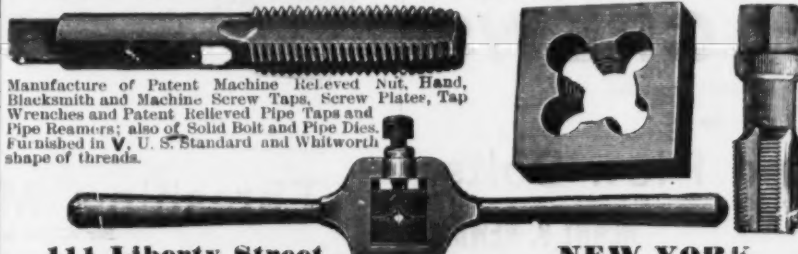
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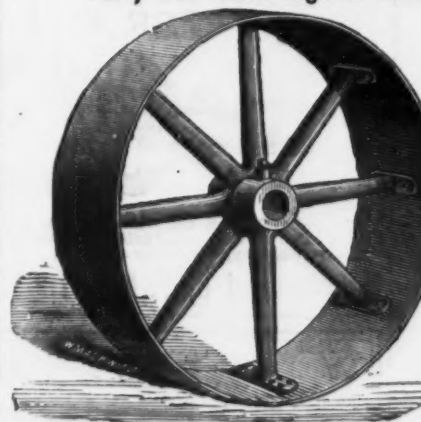
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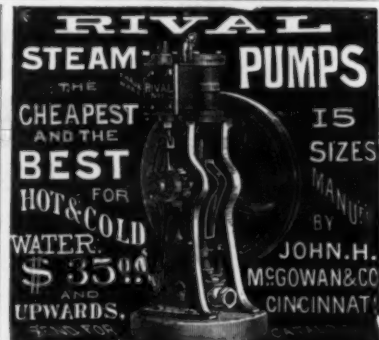
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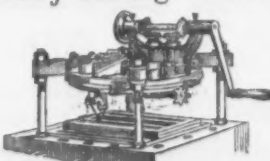
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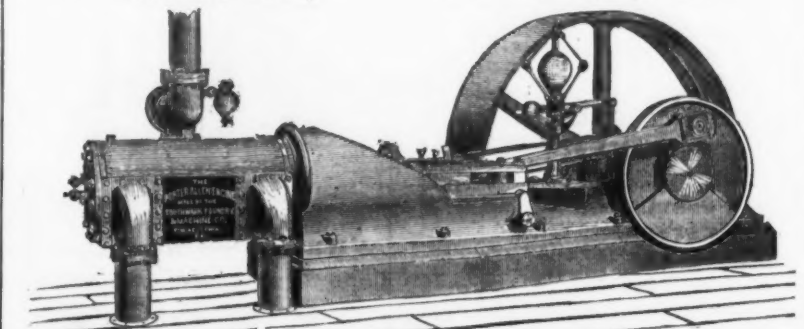
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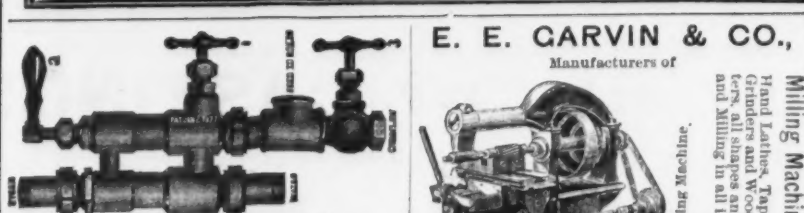
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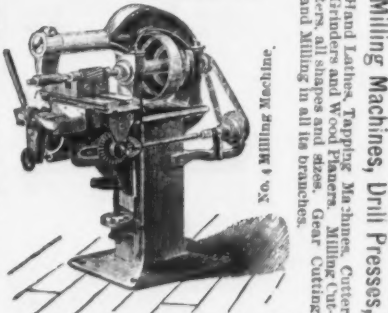
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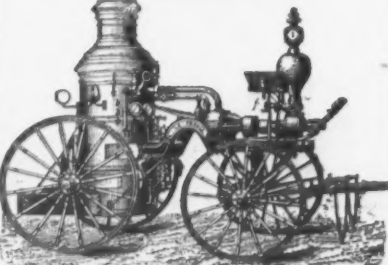
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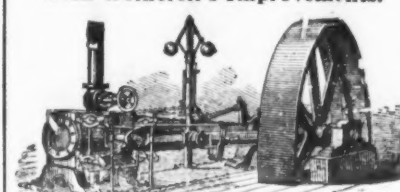


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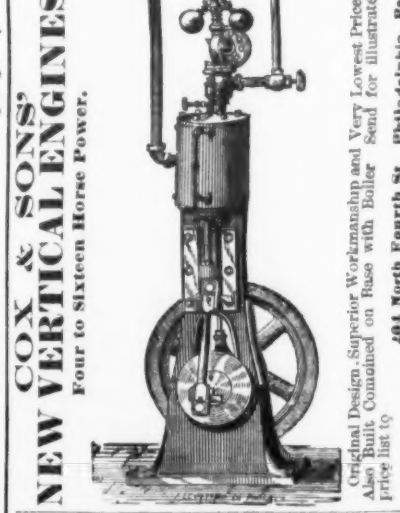
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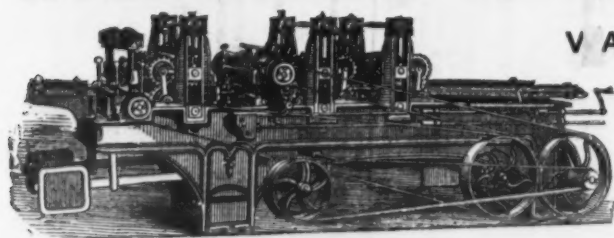
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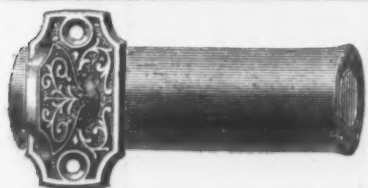
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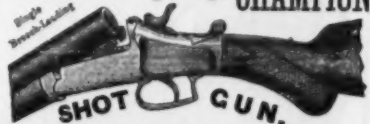
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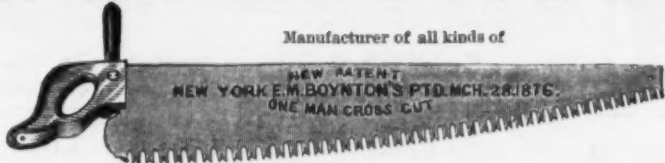
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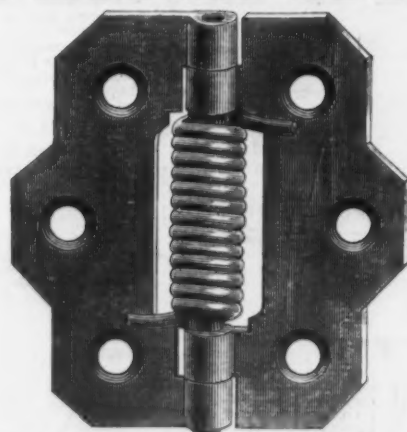
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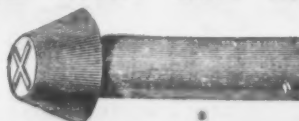
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